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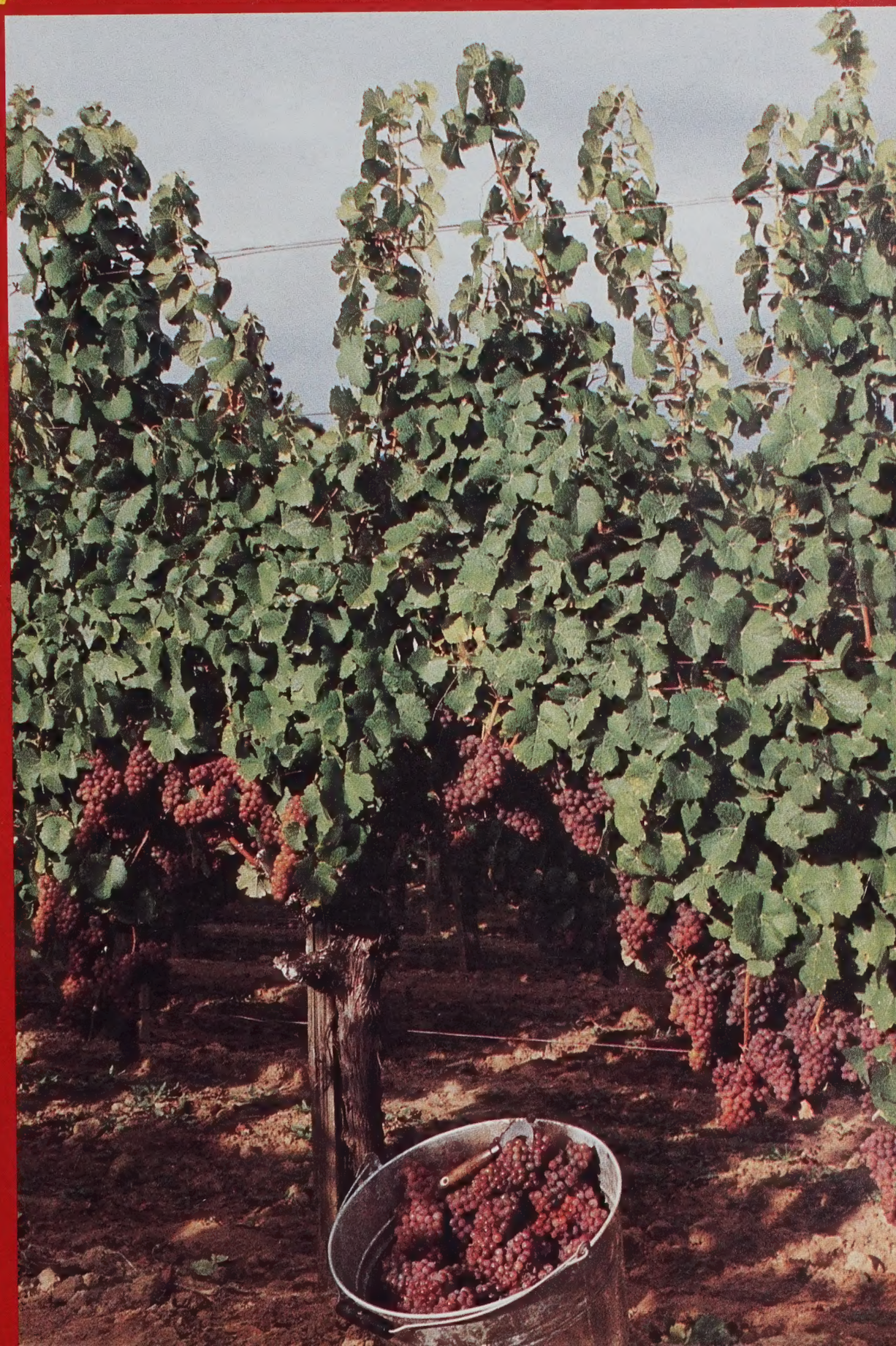

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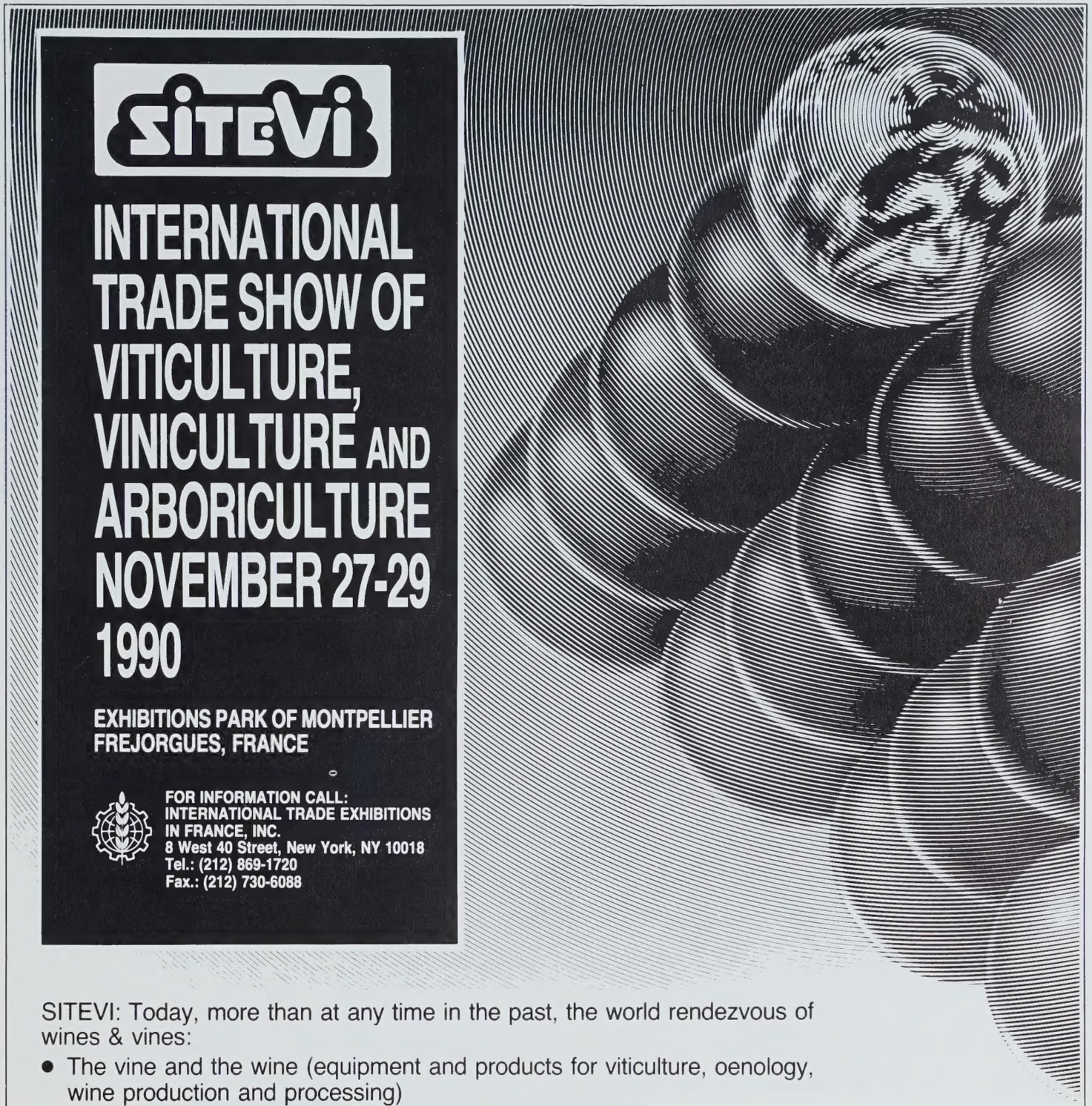

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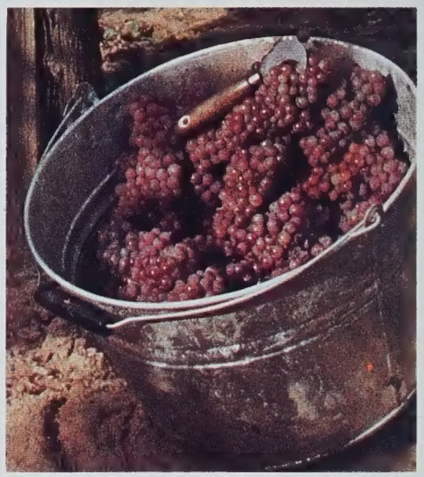
COVER Gewürztraminer at harvest. Photo by Don Neel.



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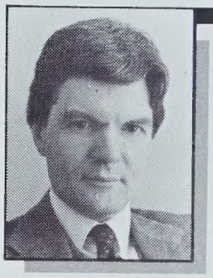


The Wine Lawyer

R. Corbin Houchins

Validity of the Government warning

What Congress did

Article I of the Constitution of the United States grants Congress power to legislate for the general welfare and to regulate interstate commerce.

In enacting Public Law 100-690 in November 1988, Congress declared that it would promote national health and safety by requiring that the public be "adequately reminded about any health hazards that may be associated with the consumption or abuse of alcoholic beverages."

It went on to assert, as an additional basis for legislating, that a national law would protect interstate commerce from "diverse, nonuniform and confusing requirements for warnings" at the state level.

We are all familiar by now with what that exercise of legislative power has brought forth: the legal obligation to disseminate, by means of your label, a message from the government containing several highly dubious or contextually misleading statements disparaging your product.

To add to the outrage, the Bureau of Alcohol, Tobacco and Firearms (BATF) has recently decided that the message must be in bold face type with a characters per inch requirement that commandeers much of the package space available for communicating with consumers.

Predecessors

The government warning law is not, of course, the first foray by government into the regulation of wine labels.

Early in this century, Congress enacted pure food and drug laws empowering the Food & Drug Administration (FDA) to regulate beverage labelling. Since commerce in wine became illegal in the United States shortly thereafter, no history of FDA wine labels developed.

With Repeal, Congress adopted the Federal Alcohol Administration Act (FAAA), which contains additional rules for liquor labels. Although the FAAA requirements appear to supplement those of the FDA Act and the later Food, Drug & Cosmetic Act, early in the game the FDA wrote a letter to what is now the BATF, ceding jurisdiction over liquor labels to the new agency. One lower court has concluded that the letter precludes application of the FDA Act to liquor labels. It is not unlikely that another court would reach a different conclusion.

An additional source of uncertainty is Congress's lack of power to enact any law abridging the freedom of speech protected by the First Amendment. Only well after adoption of the FDA Act and the FAAA was it firmly established that protected speech includes commercial messages. Thus, the limits on congressional control of what may or must be said on product labels are largely untested.

Until very recently, this uncertainty has been only of academic interest, since the FDA has displayed no interest in reasserting jurisdiction over wine labels, and BATF regulations have seldom threatened vital interests of the wine industry. When the government warning law became effective on November 18, 1989, however, the equilibrium ended.

What now?

Many wine industry members may be unaware that congressional efforts to require warning labels on alcoholic beverages have been with us practically every year since at least the early 1970's, when I started watching wine legislation.

This column is not the place to try to identify the sociological and political forces that turned a perennial nut-case proposal into federal law. Unlike ingredient labelling and some other 'public interest' proposals, the government warning by-passed the familiar BATF comment process and was not subjected to formal cost-benefit analysis. Since it was done by statute, it doesn't matter whether the warning label is consistent with the FAAA or the FDA Act.

To get rid of the label requirement would require repeal or amendment of the law by Congress, or a successful constitutional challenge in court.

The chances of future legislative action to repeal or significantly amend the law are problematic, to say the least. The law provides for an evaluation by the Surgeon General after the first year, but does not have a 'sunset' provision that would require affirmative action by Congress to renew it. The burden of convincing Congress to alter the law is on those who want a change.

Knowing the enemy

What are the prospects?

I do not think we will be effective in taking corrective action if we are blind to the appeal of the anti-alcohol position. At the risk of expressing sympathy for the devil, I believe one can argue reasonably about fetal alcohol warnings.

True, there are no reported instances of the symptoms sometimes collectively called "fetal alcohol syndrome" (FAS) apart from serious abuse of alcoholic beverages.

True, there is not a shred of evidence that use, as distinct from abuse, of table wine during pregnancy harms the human fetus.

True, there have been, to date, no examples of so-called "fetal alcohol effects" (FAE) from non-abusive consumption of any alcoholic beverage.

True, more widespread use of table wine would probably produce a net gain in public health.

Still, a question is raised by the fact that there is no research establishing a threshold, or maximum 'no-effects' level, for ingestion of ethanol (or of many other commonly consumed substances) during pregnancy.

The issue is an individual philosophical one, not determinable by scientific means: Do I continue my behavior until I have reason to think it is harmful, or do I discontinue it until I have reason to think it is harmless? How would the consumer know that such a choice is called for unless she is somehow informed 1) that many health researchers believe very large doses of ethanol during pregnancy harm the fetus spectacularly, and 2) that no one knows for sure whether a spectrum runs down to very subtle effects in the range of normal consumption of wine with meals?

Granting that tough questions have to be asked, there is an enormous difference between recognizing that an issue exists and taking the approach of the government warning law, which obliterates the distinction between use and abuse. How do we go about getting that point across?

Tactical considerations

It seems to me, at this point, that the most practical approach by the table wine industry would be to attempt to secure an amendment delegating to an administrative agency responsibility for deter-

mining what warning, if any, has to go on what product.

Since the public health aspects of different products are quite distinct, mandated warnings are a classic subject for administrative determination. The proponents of the current law are rabidly opposed to such a move, however, on the grounds that an administrative agency would be too lenient on big producers of beverage alcohol (a sub-category of alcoholic beverages consisting of products consumed for their intoxicating effect).

The rancor of public health advocates toward the manufacturers of popular lagers, neutral distilled spirits and inexpensive fortified wines raises a recurring tactical question: Should table wine producers try to distinguish themselves from the beverage alcohol industry?

A difficulty we face is that there seems to be a pervasive predilection these days to 'do something about' drugs and other evils, with little concern about whether producers of a mysterious, expensive product practically no one buys may be getting unfairly squashed in the process.

We may have a long shot at reclassifying table wine as an agricultural product, rather than intoxicating liquor. There might, therefore, be a chance to amend the act to give some other agency, such as the Dept. of Agriculture, responsibility for health warnings on table wine, butter, *etc.*, while leaving the real targets of the anti-alcohol forces subject to the mandatory labelling law. That kind of political split, however, has profound implications, not the least of which is the power of the much richer liquor industry to retaliate against wine via a tax equivalency campaign.

Alternatives

Among the remedial proposals I have heard lately, roughly in descending order of feasibility are: 1) corrective advertising, 2) counter-messages on the package, and 3) court challenge based on the misleading nature of the required text.

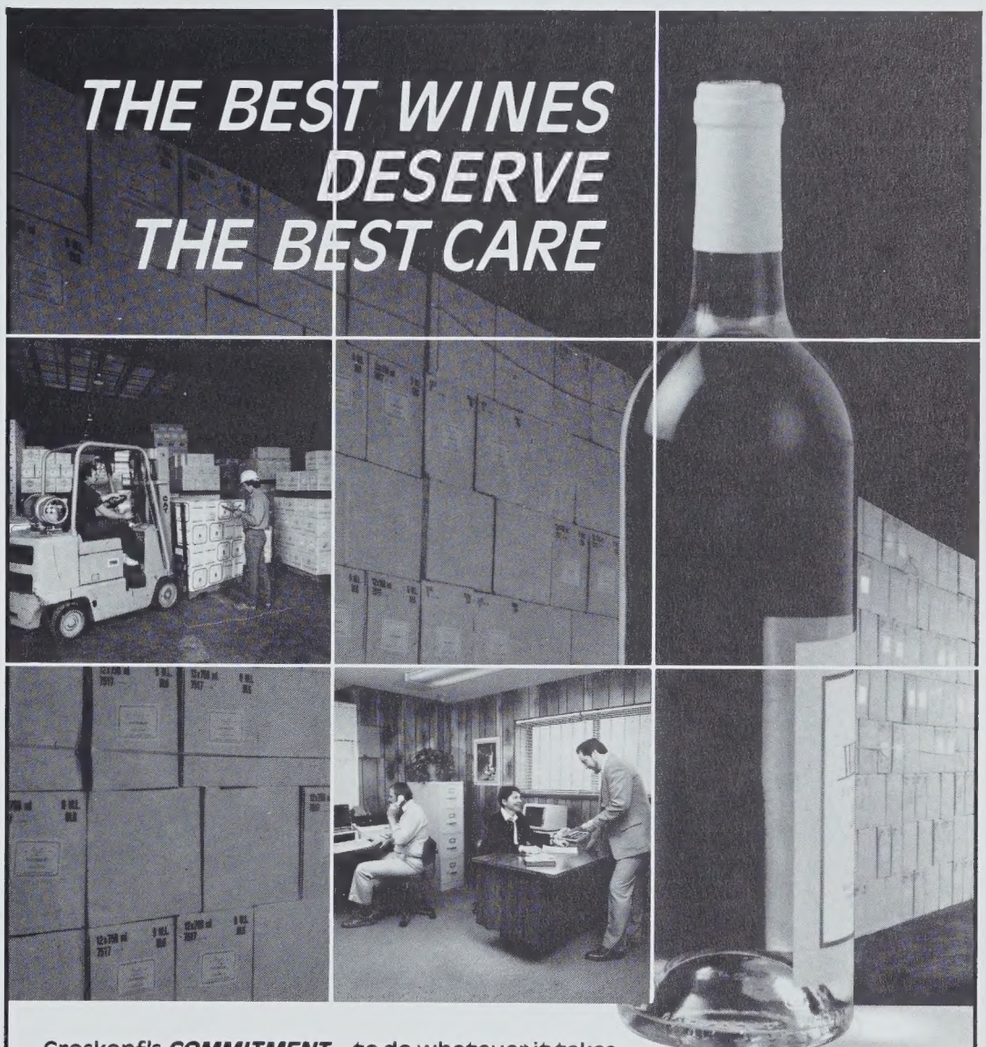
At the outset, I admit that, while the warning label law makes me apoplectic and fearful of yet worse legislation and regulation, I do not know whether the present warning has any deleterious effect on wine marketing, other than the added expense of modifying the label to accomodate so much copy. Thus, as a business matter, it may not make sense to adopt counter-measures that call attention to a controversial message until we have gauged its effects on consumer consciousness.

On the other hand, it is entertaining to speculate on what citizens might do in the face of such a stupid and arbitrary exercise of governmental power. Permit me, then, to expand on the three proposals mentioned above.

Corrective advertising: Not much question here. Table wine producers have just as much right as the government or other citizens to present their opinions in public media, including those that directly contradict the mandatory warning. The only potentially tricky part is drawing the line between a strong opinion on a public health issue and a misleading advertising claim.

While our Constitution does not require the government to make paper and printing presses available to citizens, anyone in the business should be familiar with advertising and public relations techniques. Once we formulate a cogent position, it is mainly a question of money.

Corrective labelling: Interesting. You have a constitutional right to say non-



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misleading things on your label. The recent Coors case in which a lower federal court overturned the FAAA restriction on truthful statements of alcoholic content on beer labels is part of a well-established line of commercial speech decisions.

While there are many good reasons not to do it (as your legal advisor would surely be quick to point out), I wonder if BATF could lawfully refuse approval of a label which stated something like this:

> "The message in the bottom part of this box is from the government, not from us. It is not accurate. The truth is that normal use of this product during pregnancy has not been shown to increase the risk of birth defects and that normal use of table wine by the population generally is more likely to cause health improvement than health problems. Consuming wine may temporarily impair your ability to operate a vehicle or other machinery, depending upon your body weight, how much you consume, the rate at which you consume it, what food or other liquids accompany it, your mental and emotional state, and other factors."

The BATF could probably turn down a label that said: "The following government warning is all hogwash."

Court challenge: Questionable. Granted, the warning is misleading, but Congress has decreed it, so it does not matter that you and I are forbidden by other enactments of Congress to make misleading statements on a wine label. The only real issues are: 1) whether it is outside the Article I grant of power to Congress and 2) whether it abridges the freedom of speech guaranteed by the First Amendment.

Article I

The subject is clearly one about which Congress may legislate. Requiring producers to put truthful information on labels has long been accepted as promoting the general welfare. But what about information that is not truthful?

Can promoting the general welfare be carried out by requiring certain citizens to lie in order to prevent other citizens from doing things which Congress wishes to discourage and which they would do if they knew the truth? Most likely a court would dodge that one and say that the message is not really untruthful, at worst incomplete, and that in any event, the government is not held to a very high standard in determining how the general welfare is to be promoted.

(I do not think inclusion of the words "according to the Surgeon General" is significant, though the government would probably argue that if the warning truthfully reports what she says, it does not matter if what she says is not true.)

First Amendment

Assuming that Congress has the power to promote its concept of the general welfare by promulgating misleading statements, the question remains whether requiring citizens to repeat them abridges freedom of speech.

No doubt, Congress can require disclosure on packaging of virtually any fact as a precondition to selling products for human consumption, at least in interstate commerce. But could it, for example, require a statement of patriotic content on wine labels? Could it require textbook publishers to include a favorable treatment of creationism?

If not, how different is it to require scientifically controversial statements about the product? Probably different enough, but of such questions are constitutional cases made. ■

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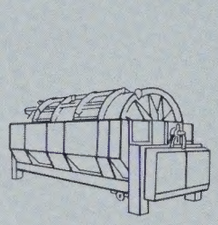

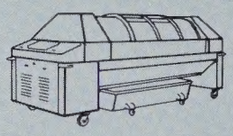

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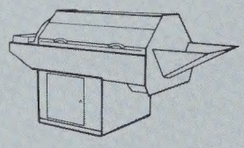

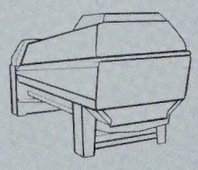

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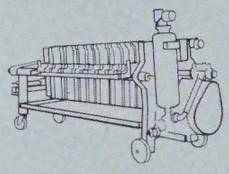

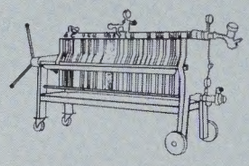

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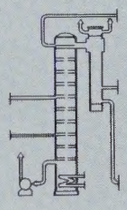

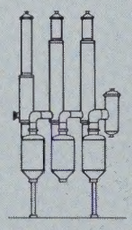

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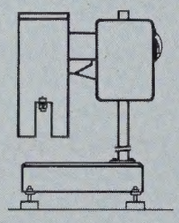

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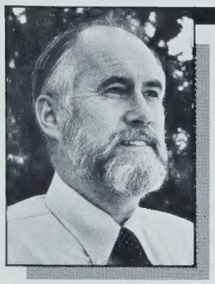

Winery Water & Waste

D.R. Storm, Ph.D, P.E.

Climate drift: Am I still a Region I?

Just as the modelers of the earth were finally getting a firm grip on a mathematical expression for the dynamics of the planet's weather, along came holes in the ozone layer, global warming (the greenhouse effect), El Niño, La Niña, and a host of other marine and atmospheric phenomena heretofore unrecorded (much less understood) in scientific experience.

One of the more unusual scientific periodicals that I receive and monitor is called ***European Scientific Notes.***[1] *A recent issue discussed the papers presented at the 21st International Liege Colloquium on Ocean Hydrodynamics.*[ibid] *Several of the papers discussed 'climate drift' and prediction methods. After digesting the article, I reflected on how these changes might influence the long-term culture of wine grapes.*

The late Professor A.J. Winkler of U.C. Davis was responsible for the development in the 1960's of the climatic index for classifying wine grape growing regions, a system still in use today.

Obviously, the cooler Region I zones of California would not require a great deal of climate drift to launch them into a Region II. I have reproduced Dr. Winkler's viticultural indices so that you can predict where your area would shift with, for example, a 1°F increase in temperature during the growing season. (Daily temperature averages for your particular area can be found in the Climate Summary of the U.S., published by the National Oceanographic and Atmospheric Administration.

Wine Grape Growing Region Index

Region	Degree Days*
I	<2500
II	2501 - 3000
III	3001 - 3500
IV	3501 - 4000
V	>4000

* Summation of number of days in the wine-grape growing season × average daily temperatures.

Water tanks — what's to know

Winemakers are well-equipped by training and experience to fathom the technology of vessels, tanks, bottles, and other containers. The only major difference between water supply storage vessels and wine tanks is that the former are not static, but rather containers which generally 'float-on-the-line' in an oft-repeated fill and empty sequence.

Water tanks have many of the same features as wine tanks, plus several more that are essential for their function — *i.e.*, level controls (altitude valves, electronic and pressure cells), vents and insect screens, inlet, outlet, and drain pipes, overflow pipes, and water level indicators.

Water storage tanks may also serve as pressure vessels (those with a so-called hydropneumatic configuration) or as accumulators to prevent pressure surges from well pumps and other water-source prime movers. Small 'package' systems (100 to 550 gallons) are available and

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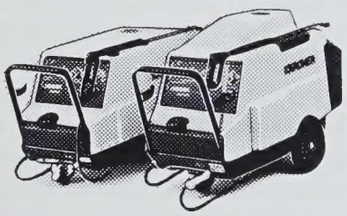

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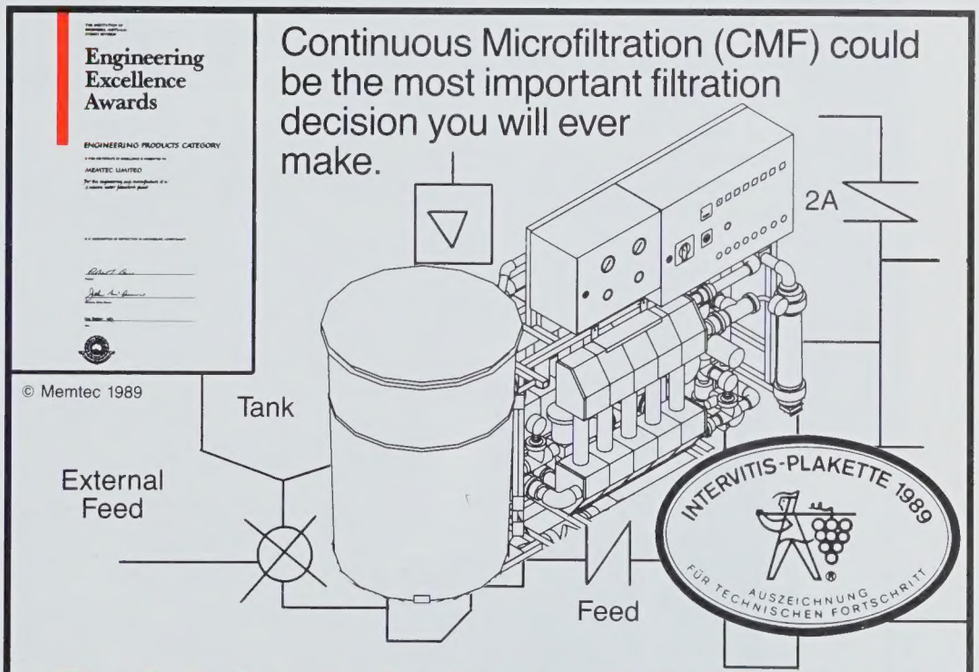

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often come pre-assembled, with piping, electrical controls and valves all in place, greatly simplifying installation and, ultimately, the installed cost.

Ideally, tanks are situated to take advantage of elevation differences necessary to provide the requisite operating pressure in a winery. For routine winery sanitation purposes, 45 to 55 pounds per square inch (psi) dynamic gage pressures are sufficient. High pressure (150 to 200 psi) subsystems can be installed to provide both hot and cold water facilitating more efficient cleaning of troublesome wine residues around crush and press equipment.

Economics, however, generally favor the use of portable, high-pressure (2,500 to 3,000 psi) washers with gasoline engines, which can be used to remove persistent tartrate deposits or, in the extreme, scale-paint. The advantages of these washers over fixed piping systems are their portability and ability to create incredible pressures for a variety of winery uses.

If the winery site does not have elevation differences allowing the use of gravity to create the required water pressures, pressure augmentation by booster pumps and/or air cushion tanks (hydropneumatic tanks) must be employed. While it may appear to be prudent to combine storage tank functions (production process water supply and fire protection, for example), Uniform Building and Fire Code regulations (see **PWV**, Jan/Feb '90 and March/April '90 on "Fire Protection Systems") require that fire-flow storage facilities must be ***single-purpose.***

Tanks probably are beautiful only to tank designers and fabricators. Nonetheless, tank siting for visual impact at a winery should be considered. Earth tone paints and coatings, landscape screens, and the ultimate solution, burying the tank, can all be employed, singly or in combination.

Materials of Construction

Almost any structurally-rated material can be used (and has been) for water tank construction. Some factors to be considered in the selection of the material are:

- raw material cost,
- cost of fabrication (field or shop),
- cost of maintenance (painting),
- over-all life cycle cost,
- water quality maintenance,
- seismic safety,
- tank foundation costs.

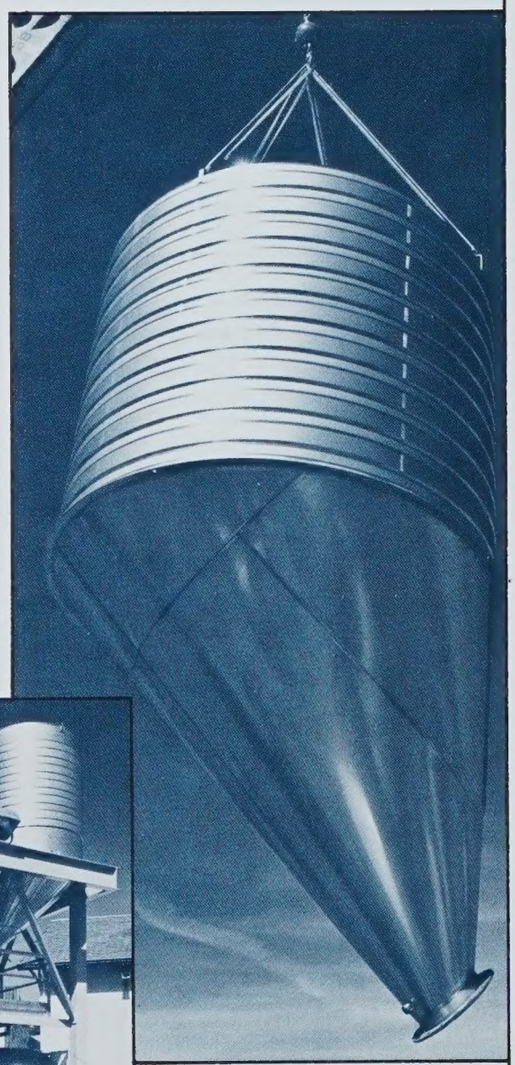
Winemakers should already have a cost reference for evaluating other tank material options. Stainless steel (304 or 316) used for wine tank construction is probably the most expensive construction material. However, the extraordinary features required of wine tanks, such as cooling jackets and high luster polishing to facilitate cleaning and sanitation, often make such cost comparisons misleading.

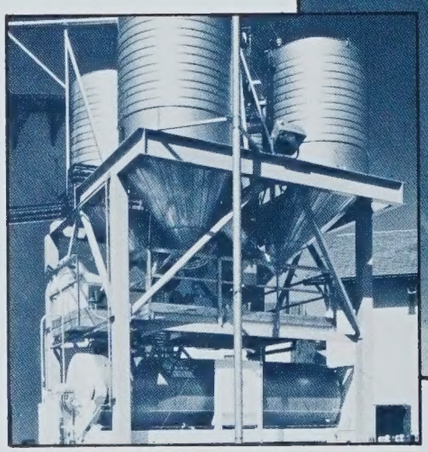
Redwood tanks are often considered by wineries in the western U.S. because of their availability in the used wine-tank market, and because they blend nicely with a winery's exterior features and utility needs.

Capital costs for new wooden tanks up to 500,000 gallons have historically been competitive with other tank materials. Fabrication is accomplished on-site for larger tank volumes, while smaller tanks (10,000 gallons or less) can be factory-assembled and transported to the site for installation.

Dejuicing Tanks

Santa Rosa Stainless Steel is the leader in providing the wine industry with tanks for dejuicing, fermenting and storage. More than 500 wineries use Santa Rosa Stainless Steel tanks. Our dejuicing tanks are built with truncated tops for easy access to the interior drain screen. The tank yields 100-130 gallons of juice per ton of grapes, with less than .5 percent solids. Truncated bottoms facilitate emptying. A typical dejuicing system, with four tanks suspended over the press, can be operated by one person. Our 20 years of experience can be useful in designing winery floor plans. Call today for information or free estimates.





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In our experience, used wooden wine tanks may encourage certain types of biological growth in the stored water. Iron bacteria and other non-photosynthetic organisms (fungus and slimes) will grow on the walls of the semi-rough interior of the tank. Ultra-cleaning with high-pressure washers and disinfection with 'Iodofor', a commercial iodine-based compound, can reduce or, in some cases, eliminate this problem.

Size limiting highway transport and fabrication parameters apply to most tank materials. A good rule of thumb is that a tank measuring 15 feet in diameter and about 60 feet long can be hauled by conventional carriers on most roads and inter-state highways without special permits (with escort vehicles and wide-load approvals).

Mild steel tanks require protective paints and coatings both inside and outside if they are above ground. Epoxy paints (most expensive) are the most durable (see **PWV** July/Aug '89, "Paints & Coatings").

Buried steel tanks are subject to galvanic corrosion (they behave like a big battery), and special cathodic protection must be provided through the use of 'zincs'. These plates of zinc metal are attached to the tank; because of the superior valence (positive electrical charge), they corrode while the steel remains metallurgically unaltered.

The used steel tank market nationwide is flush with used, underground fuel tanks. Many have been abandoned or replaced with double-walled fiberglass or steel tanks to meet more stringent federal and state requirements for hazardous waste storage.

While the salvage cost of used tanks usually consists only of the cost of excavation and transport, the cost of inspection, sandblasting, and painting can bring the per gallon unit cost of additional water storage to approximately the same cost of a new steel tank.

Check the used fuel tank market in your area; however, if your winery plans call for supplemental storage tanks in the near future, be sure that you have a competent structural and metallurgical consultant certify the integrity of the tank and obtain some type of warranty from the tank refurbisher.

Level Controls

To ensure a reliable cycle of tank filling and emptying, a suitable system of fail-safe controls must be installed. Level controls can be as simple as a float switch (a buoyant shape attached by an arm that mechanically activates a switch) to a sophisticated pressure cell (a pressure transducer), which transmits a 5 to 20 milliamp signal to a solid state controller, which in turn energizes the tank supply system.

The winemaker's understanding of generic wine tanks should allow him or her to actively participates in most of the technical judgments regarding the economics of water tank selection. However, it may be wise to leave the hydraulics and control system selection to equipment suppliers and/or consultants. ■

David Storm is a Consulting Civil and Sanitary Engineer and Owner of Winters Winery.

References

1. *Proceedings of the 21st Int. Liege Colloquium on Ocean Hydrodynamics,* May 8-12, 1989, Liege, Belgium, European Scientific Notes, August, 1989.

2. *General Viticulture,* Winkler, A.J. and M.A. Amerine, U.C. Press, 1962, pp. 504-576.

Fermenting Tanks

Dimpled cooling jackets on fermenting tanks from Santa Rosa Stainless Steel carry a high-pressure flow of glycol, freon or ammonia to ensure continuous, precise temperatures of the wine. Low-pressure channel jackets carrying glycol and water also are available. Santa Rosa Stainless Steel is the industry leader in tanks for fermenting, dejuicing and storage. The wine industry has invested in nearly nine thousand of our stainless steel tanks during the last 20 years. Call today for information or free estimates.

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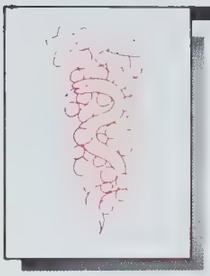

Wine & Health

Wells Shoemaker, MD

MODERATION — The true temperance

There will be peace in our time.
— Neville Chamberlain
We're not prohibitionists.
— The prohibitionists
When in doubt, tell the truth.
— Jiminy Cricket

About five years ago, wine writers started alerting their readers to the 'New Temperance Movement'. That was a poor choice of words.

Leon Adams, who earned his first journalistic stripes covering the prohibitionists of the 1920's, keenly pointed out that the new bunch, just like their forebears, were most definitely ***not*** *advocating* ***temperance****, but rather hostile exclusion of other people's pleasures and perogatives.*

True temperance forms the foundation of America's wineries. Temperance is a philosophy and lifestyle which avoids excesses and seeks a harmonious balance of many elements. Temperance is moderation. It's a good word.

Robert Mondavi and his many disciples have proudly proclaimed wine the 'beverage of moderation', and they're right.

Meanwhile, our ox is being gored along with the beverages of excess: mass-produced beer and cheap spirits. Of course, that is no accident, since the prohibitionists (proibs) hold that all different alcoholic beverages are simply the same toxic substance in various dilutions.

The proibs deliberately omit the solid evidence of improved longevity for moderate drinkers compared to both abstainers and abusers, while trumpeting the hazards of abusive consumption as though they afflicted all drinkers.

The proibs maintain that there is no meaningful distinction between abuse and moderate use. They cite deliberately distorted statistics regarding the costs to society of the disruption, destruction, and death caused by alcohol, without ever really acknowledging that they are looking at consequences of abuse.

Most hypocritically, in their zeal to hobble and degrade an industry, the proibs ignore clear-cut evidence throughout history and around the world that curtailing the supply of an abused substance may reduce total consumption, but will not affect whatsoever the occurrence and consequences of its abuse.

There is no room in the prohibitionist paradigm for civilized, gracious, and healthy moderation. Like a foxtail entering a puppy's ear, the proib thrust seeks only deeper and more painful penetration.

Polite, educational overtures to the proibs have been suggested by many influential industry figures, but Chamberlain's diplomatic mission to Germany had a greater chance of peaceful compromise.

Let's be direct —

Why is wine a beverage of moderation?

The ethanol molecule in a bottle of wine is no different from the molecules in light beer or tequila. The ethanol in wine is absorbed more slowly into the bloodstream due to the influence of phenolic compounds in wine, but the most telling

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difference is the style, social setting, timing, and manners with which wine is served.

Wine is a food for the dinner table, specifically intended to accompany other foods for the improved appreciation of all components. The consumption of wine by sipping, together with the buffering by food, delays the absorption of alcohol and reduces the peak blood levels compared to gulping beer or spirits on an empty stomach.

A bottle of wine offers a direct visual register of how much has been consumed. When you get to the bottom, you're finished. This feature contrasts sharply to the beer tap at a bar or the bottle of spirits which dips 'a few fingers'.

People customarily finish their wine in the early evening. Bar drinkers may keep consuming beer or spirits until midnight or later, by which time the effects of day-long fatique may compound the intoxication of ethanol.

Wine is very rarely the chosen beverage for alcoholics, who do not drink to savor the subtle nuances of bottle bouquet or how Sauvignon Blanc complements steamed clams. They drink for the effects the alcohol brings to their minds and bodies. (See **PWV**, March/April'89, for a detailed discussion of alcoholism).

Wine is an inefficient source of alcohol by volume, as well as a miserably expensive one for the consumer looking for alcohol-per-dollar economy.

Studies of the health impacts of drinking in France show that the greatest problems occur in regions using primarily beer and spirits, the fewest problems in primarily wine-producing areas. The reporting authors concluded: "Contrary to the stereotype about France, wine is ***not the beverage that contributes most to alcoholism***; the production of spirits and the importation of alcoholic beverages play undoubtedly the most decisive role." (See **PWV** Jan/Feb'90).

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Drunk driving arrests involve wine as the offending source in only 2% of cases. Most drunk driving atrocities and repeat offenses are perpetrated by alcoholics who ignore blunt biological cues of intoxication, (not to mention warning labels). Blood alcohol levels in these cases usually vastly surpass the legal limits — 0.2 or higher are commonplace.

The down side

Wine can, unfortunately, cause problems when it's removed from its traditional place on the dining table. Large public wine tastings represent one vulnerable area. While the tastings offer one of the precious few public interfaces for very small wineries, some small winery staff may not be skilled in recognizing intoxication and manipulating the abusing consumer toward safety.

Tasters may roam from table to table depriving stewards of the chance to observe the patron over time. There may be little opportunity for conversation and the visual reference of the declining level in a bottle isn't available.

An alcoholic who rarely voluntarily chooses wine may accompany his wife to a tasting, or vice versa, and trespass beyond prudent consumption.

Tasting rooms in areas densely populated by wineries create another vulnerable situation. Individuals seeking to 'hit' many wineries may arrive intoxicated, causing more than just PR problems with your valued customers: the intoxicated cruiser may hurt someone in your parking lot.

A final tarnish upon the 'beverage of moderation' image is the universal perception of the skid row derelict as a 'wino'. In fact, only a minority of end-stage alcoholics use the cheap fortified wines so often blamed for the problem, and virtually none of them got to skid row using wine as a vehicle.

Bottom line

The prohibitionists seek to choke all producers of alcohol with regulatory rubbish, cripple them with restrictions of trade, and finish them off with lethal taxation schemes.

Wine doesn't belong on the same gallows with 12-packs of bland beer and $6 gin in plastic bottles, but the death of the 'beverage of moderation' would be a small, unmourned casualty in the holy war of prohibition.

It's not certain that an appeal can be heard this late in the fray, but certainly the message of moderation is our single

best chance to gain a reprieve. If it still matters, it's also the truth. ■

Dr. Shoemaker is the winemaker at Salamandre Wine Cellars and a California pediatrician. He deals better with temper tantrums than temperance hypocrisy.

New Capsules to be offered

RAMONDIN, supplier of tin-lead capsules for 100 years, has announced that they will be able to produce all-tin or all-aluminum capsules of equal quality as alternatives to tin/lead capsules in 1993 or sooner.

Fernando Torrontegui, Sales Director of RAMONDIN, S.A. (Spain) visited California wineries in April, 1990, to introduce samples of the two capsules prepared by RAMONDIN's research and development department, with a view to eliminating the lead content from wine capsules.

The all-tin and all-aluminum capsule will provide a metallic capsule with the same look and performance as the tin-lead capsule.

Torrontegui believes it will take three years or less to convert current production processes and perfect lamination methods and techniques to dry decoration on alternative materials. RAMONDIN believes it will be able to supply at least 50% of the current U.S. market volume within three years, but for the time being, State Legislatures in the U.S. should consider there to be no 'feasible alternative' to the tin-lead capsule.

The aluminum capsule presents some difficulty for opening due to the hardness of the material but the tin capsule can be cut as a tin-lead capsule is cut. The cost of the aluminum capsule is expected to be similar to the tin-lead capsule whereas the tin capsule cost will be substantially higher.

RAMONDIN suggests that wineries will have to make slight modifications to the capsule spinner head since both materials are harder than tin-lead.

For more information, contact: RAMONDIN USA, Inc., PO Box 2266, Napa, CA 94558; phone: 707/944-2277. ■

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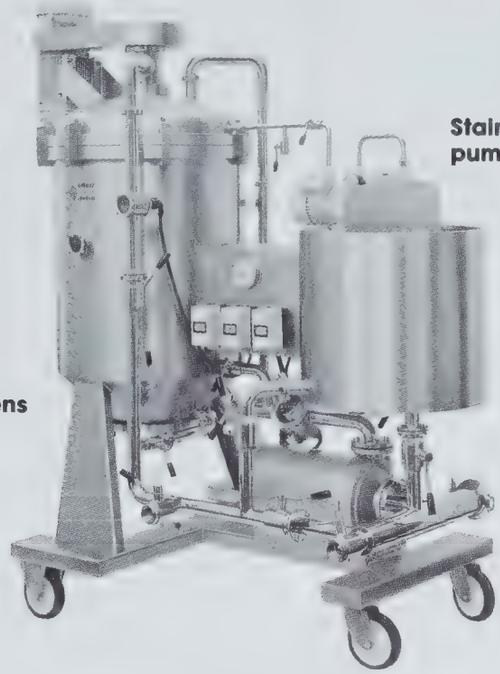
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Gewürztraminer

'WHAT'S HER NAME?'

by Eleanor & Ray Heald

With origins in the Palatinate just north of the Alsace region of France in the center of western Europe, and often referred to as 'Spicy Traminer', Gewürztraminer should not be confused with the inferior variety Traminer, which since 1973, has been officially banned in Alsace.

Alsace, a region approximately twice the size of Napa Valley, CA, has about 2,600 hectares (6,600 acres) or 21% of the vineyard land planted to Gewürztraminer, making it the most widely planted variety in the region.

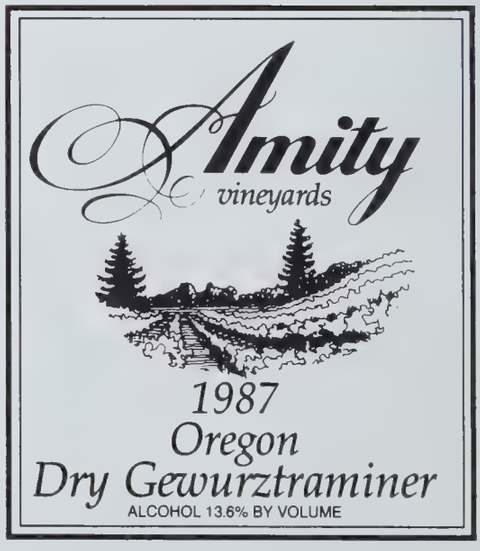
If the wines are bone dry, Gewürztraminers produced outside the Alsace region of France, are often characterized as having an Alsatian style. This generalization would lead us to believe that there is one 'Alsace style' for the wine.

Nothing could be further from the truth because styles of Alsace Gewürztraminer and their ability to age, vary dramatically depending on many factors, including the soil characteristics and altitude of the vineyard.

Wine has been been made in Alsace since Roman times. By the 14th century, the vineyards were flourishing and the wines were exported to England. Grapegrowing traditions in the region are well-founded and the matching of grape varieties to the correct soils is a refined art.

Although American winemakers admit that Gewürztraminer is still a hard sell, many are committed to its production and have achieved marketing success. Several wineries have found that tasting room sales of the wine are brisk because the wine can be hand-sold.

PWV *thanks Rutherford Hill Winery, St. Helena, CA, for hosting the tasting and the following winemakers for participating: Ted Bennett, Navarro Vineyards; Steve Dorfman, Fetzer Vineyards; Jerry Luper, Rutherford Hill winery; Michael Martella, Thomas Fogarty Winery; and Norman Yost, Mark West Vineyards.*



Owner/Winemaker: Myron Redford

Wine Style

Redford likes full-bodied, dry Gewürztraminers with a good mouthfeel. "My

model is Alsace," he says. "I enjoy drinking them."

Redford describes his wine as having a grapefruit, spice, and nutty character and prefers it with smoked meats, fish, and sausage. He also finds it appealing with fish, clams, and spicey, oriental food, but cautions that 'hot' oriental cuisine tends to over-emphasize the wine's alcohol.

"Spicy flavors are apparent in the grapes when they turn a deep color, so picking at the optimal time is critical," he says. "Secondly, a spicy character in the wine appears with about two years' bottle age and optimum enjoyment is three to five years."

Redford tries to avoid a harshness and excessive bitterness in the wine's finish. He has begun to add gelatin just after crushing to remove phenolics that come with very ripe fruit.

Grapegrowing

"Locating the vineyard in the correct climate is the most important viticultural factor," comments Redford. "It's all over if it's too warm." Of much less importance to him is exposure of the fruit to light. A cool site in a cool climate allows flavor maturation without excessive Brix levels that force a winemaker to leave residual sugar or end up with an unbalanced wine.

Amity's Gewürztraminer is a blend of grapes from six different hillside vineyards. Common to all vineyards is self-rooted vines with a planting density of 600 to 700 vines/acre in north/south oriented rows. The vines are principally cane-pruned on an upright trellis and are hand-harvested and yield less than three tons/acre. "Our estate vines are pruned to 60 buds and flowering is in June," reports Redford.

Almost all the soils are clay-loam and receive no irrigation. There is an average annual rainfall of 30 to 35 inches.

"There are little to no disease problems with this variety," suggests Redford. "The major problem for Gewürztraminer in the Williamette and Umpqua Valleys is poor set due to cool weather at flowering."

Grapes are picked in the first or second week of October with the following parameters: 21° to 23.4° Brix, 0.41 to 0.87 TA, and 3.37 to 3.55 pH. "The fruit is dead ripe, almost purple," states Redford. "The most significant picking gauge is taste."

Winemaking

Crushed grapes with 0.05g/L SO_2 added, are pressed with ½ to ⅔ of the stems as a press aid. Free fun and press juice are combined, settled overnight and racked off the juice lees, before inoculation with 2-lbs/1,000-gal of freeze-dried Champagne yeast. Fermentation in stainless steel tanks is maintained under 55°F. D.A.P. is added as a yeast nutrient at 1-lb/1,000-gal to the fermenter.

An addition of 40ppm SO_2 is made at the end of fermentation when the wine is racked off the yeast lees.

"The secret of aromatic whites like Gewürztraminer is to handle it as little as possible," Redford reveals. "We fine for heat stability with 4 to 6-lbs/1,000-gal bentonite and if possible, cold stabilize in the fermenter. We tight DE filter into the bottling tank.

At bottling, 0.45μ filter pads are used. The free SO_2 is 30 to 35 ppm. Total SO_2 levels at bottling are below 100ppm.

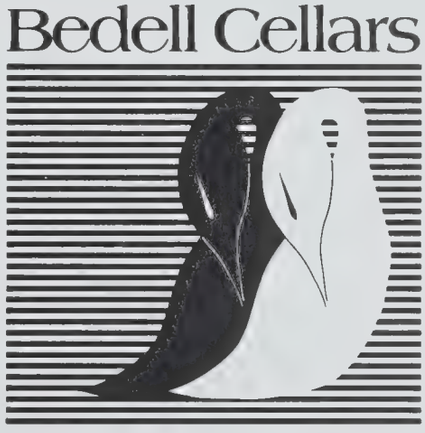
I would like to have 12 to 18 months of bottle age before release," says Redford. I think the 1987 Gewürztraminer is still improving and will peak in two to three years. The 1982 is slightly past its prime now, with some bottles showing age."

Tasting Notes: 1987 Gewürztraminer

Color/Aroma: Medium color. Mild citrus undertones; light to medium floral intensity; slightly spicy; clean; Muscaty; pine forest.

Flavors: Grapefruit; dried weeds, earthy, flat.

Balance/Finish: Well-balanced; lingering finish. Low acid; slightly tired fruit flavors; sweet; bitter.



Owner/Winemaker: Kip Bedell

Wine Style

Bedell is aiming for a dry, food wine with moderate alcohol and firm acidity. He characterizes his wine as having rose petal, citrus, and lychee nut aromas together with flavors that are citrusy and spicy. He believes this style complements fish with lemon flavoring accents; pasta, turkey, and chicken in a tarragon and honey sauce.

"The fruit must be ripe," Bedell states. "With one eye, I watch for a bright, rosey-red color in the berries, and with the other eye, I watch the pH. I'm not too concerned about sugar levels.

"I want to produce a wine that has an optimum consumption time of one to four years."

Grapegrowing

All fruit originates from Bedell's flat vineyards with well-drained, sandy-loam soil in a maritime climate. Vines are planted 605 vines/acre in north/south rows and are not irrigated.

They are cordon-trained (cordon is three feet above ground) and spur-pruned to control excess vigor, the major problem at this site. Bud break is about May 1, bloom about June 15, and veraison about August 15. Leaf pulling is done approximately two weeks after berry-set to expose the fruit.

Half of the vines are planted with SO4 rootstock and the remaining vines are planted with #3309. Machine-harvesting in mid-September yields three to four tons/acre.

Winemaking

Pectic enzyme (20mL/ton) is added to the gondola during harvest. The grapes are pressed directly. Tartaric acid is added if the pH is greater than 3.4. Juice fining is done with 2-lb/1,000-gal of bentonite.

Epernay II yeast at 2-lbs/1,000-gal is employed in a fermentation maintained at 55° to 58°F in stainless steel tanks.

At the first racking following fermentation, 50ppm SO_2 is added and 0.80 molecular SO_2 is maintained thereafter. Racking is done monthly for the first three to four months followed by one coarse to medium pad filtration in January or February.

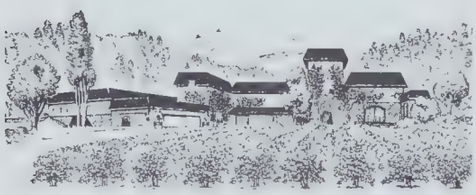
There are EK filter pads in front of a 0.45μ cartridge on the bottling line. The SO_2 at bottling of the 1988 vintage was 27ppm free and 73ppm total. The wine is released five to six months after bottling.

Tasting Notes: 1988 Gewürztraminer

Color/Aroma: Medium straw. Citrus, melon; lacks spice notes; hidden fruit; baked muffins; floral; Riesling-like.

Flavors: Citrusy middle echoes nose; slight grapefruit finish; hint of cloves.

Balance/Finish: Soft entry; balanced acid and sugar; thin, watery; too much citrus upfront; appealing; dry without bitterness.



FETZER

CALIFORNIA

GEWÜRZTRAMINER

Winemaker: Steve Dorfman

Wine Style

"Developed from many different viticultural areas, Fetzer Gewürztraminer is fermented cool (48°F to 50°F) to retain a foward, fresh, fruity, floral, spicy quality," says Dorfman.

The wine has some residual CO_2 to present a lively mouthfeel, was arrested at approximately 3.0% R.S., and exhibits rich, spicy, forward fruit, (apricots and peaches) and floral (honeysuckle) impressions. It is slightly sweet with a sprightly palate and showcases the spicy, fruity flavors of apricots, pineapple, and a light honey note.

In this style, it can be served as an aperitif wine or with spicy food preparations such as oriental, Asian, or Indian cuisine. It is also versatile as a dessert with poached fruit (particularly pears) or alone with fresh fruit.

The main thrust is a fresh, fruity, lively wine styled to be consumed within a year of vintage and preferably not more than 1½ years after the vintage.

Grapegrowing

The vines, in various vineyards throughout California, range from new production to 20-years-old with an average age of 15 years. They are typically spaced 12×6, principally on AXR-1 rootstock in east/west rows.

Training and trellising varies with the site and growing conditions. The majority of vineyards are sprinkler irrigated, but some have a drip system.

Grapes coming from the Central Coast (about 70% of the total) are mechanically-harvested and yield four to eight tons/acre depending on the viticultural practices and location.

Grapes are generally harvested in late August and early September. The North Coast fruit is typically purplish/reddish with some green berries while the Central Coast grapes are a more uniformly crimson-red color.

Dorfman looks for an optimum sugar range of 21.5° to 22.5° Brix, excellent color and maturity, spicy richness in grape flavor, and low, natural pH and high acid (0.8 to 0.9).

Muscat Canelli is added to the Gewürztraminer at approximately 5%. These grapes are grown in various parts of California, from Lake County to Santa Barbara County. The hand-picked fruit meets the following harvest criteria: 21° to 22° Brix, 0.75 to 0.85 TA, and 3.4 to 3.5 pH. Vinification is identical to the Gewürztraminer in order to enhance the fruity, spicy qualities.

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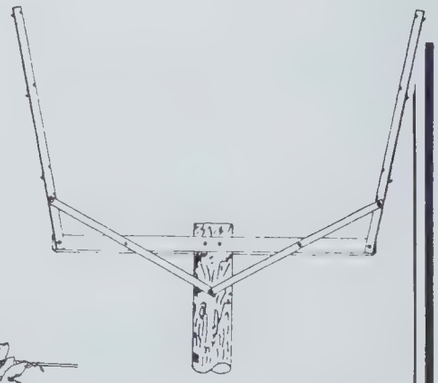

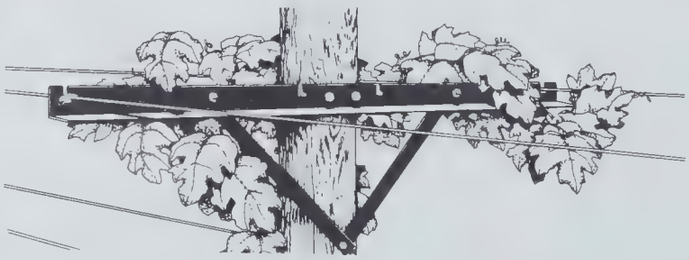

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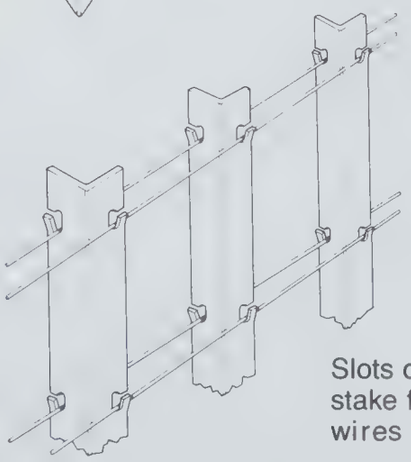

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Winemaking

Grapes are crushed to overhead drain tanks and receive six to 12 hours of skin contact. Free run juice is drained off and the must is dumped into the press. When needed, rice hulls are used as a press aid. The juice is settled overnight and centrifuged and pumped to the fermenter where bentonite and yeast are added.

The target pH is 3.1 to 3.2 and adjustments are made to this, if necessary. The juice is fined with 6-lbs/1,000-gal of bentonite. Freeze-dried Epernay II yeast (2-lbs/1,000-gal) is the inoculum in stainless steel tanks controlled at 48°F to 50°F.

SO_2 at 60ppm is added to the product tank after centrifuging when arresting the fermentation. SO_2 adjustments are made to maintain 25ppm to 30ppm free. Bottling SO_2 is based on pH and adjusted to 25ppm to 28ppm free with a total of about 75ppm to 80ppm.

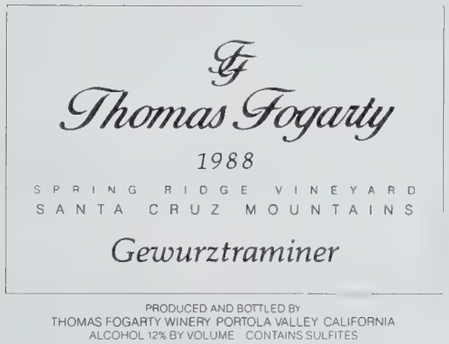
The wine is rough-DE filtered off the tartrates from cold stabilization. There is a polish filter, prefilter and membrane on the bottling line. The wine is released two months after harvest. Blends are held in tank and bottled as needed to meet sales requirements.

Tasting Notes: 1988 Gewürztraminer

Color/Aroma: Light to medium straw. Lemon, spice, hints of cinnamon; Muscat; perfumey.

Flavors: Rich and round; apples; hints of oranges and orange blossoms; floral; fresh honey; grapefruit zest.

Balance/Finish: Rich middle; soft finish; well-balanced; vibrant CO_2; crisp; good structure; delightful sipper.



Winemaker: Michael Martella

Wine Style

Gewürztraminer from Thomas Fogarty Winery is dry with spicy, bright fruit. "This style is a consequence of plantings in cool mountain vineyards of the Santa Cruz Mountain region," says Martella.

The wine is released eight months after harvest and the suggested optimum consumption time is within two to three years following harvest. Martella suggests that this style best accompanies lighter foods.

Grapegrowing

The Region-II vineyard, in the Santa Cruz Mountain appellation, has a 10% south/east slope with heavy, acidic soil that is moderately well-drained.

Self-rooted vines are planted 9×7 in north/south rows. They are head-trained with four canes. Each cane is spread out with a 12-inch cross-arm. Average yield is three tons/acre.

Annual rainfall averages 20 to 30 inches/year. A drip system is used to irrigate weekly between June and August, delivering approximately six to eight gal/vine. Bud break is mid-March, bloom is mid-June and veraison is about August 1.

Grapes are picked about September 1, based on taste, sugar levels and overall appearance of the vines. They generally taste ripe in the range of 21.5° to 23.0° Brix.

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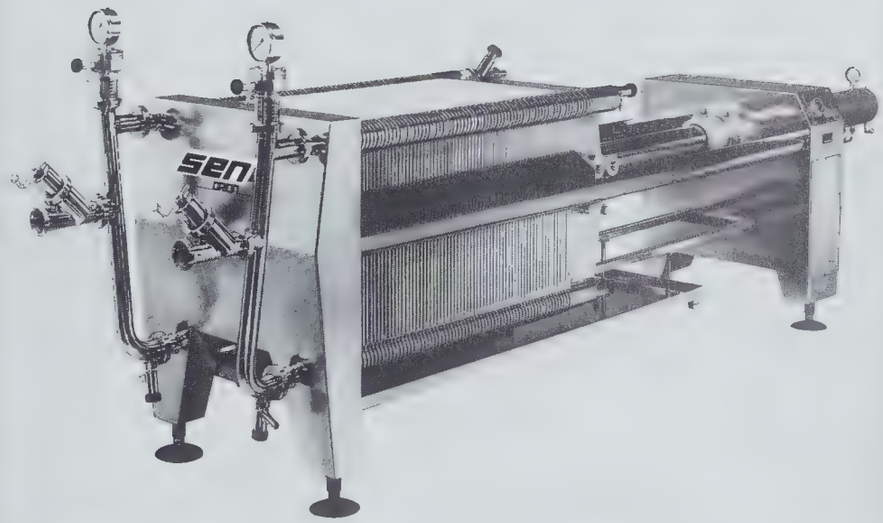

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Winemaking

Hand-picked grapes are crushed and given 16 hours of skin contact before pressing with rice hulls as a press aid. The juice is settled 24 hours at 45°F and racked to a fermenter for inoculation.

Tartaric acid adjustments are made to 1.0 TA prior to fermentation and are readjusted, if needed, after fermentation to 0.75 TA. Approximately 3-lbs/1,000-gal of bentonite is added to the juice after settling. Rehydrated Montrachet yeast is used as an inoculum at 500g/1,000-gal for fermentation in 1,000-gal stainless steel tanks in a fermentation temperature range of 40°F to 45°F.

When fermentation completes, the free SO_2 level is brought to 20ppm and maintained at that level until bottling when the free SO_2 is raised to 25ppm. Total SO_2 at bottling is between 50 and 75ppm.

The wine is treated with an additional 3-lbs/1,000-gal bentonite in tank and filtered once before bottling. A 0.45μ membrane is ahead of the filler at bottling. The wine is bottled in February after the harvest.

Tasting Notes: 1988 Gewürztraminer

Color/Aroma: Light, pale straw. Cloves, baked apples, spicy background; floral; peach, cinnamon, citrus.

Flavors: Citrus and appley fruit; slightly Muscaty; lively.

Balance/Finish: Sweetness masks fruit; balanced; clean; crisp; medium length; attractive.

Winemaker: Olivier Humbrecht

Wine Style

Domaine Zind Humbrecht Gewürztraminer Hengst Grand Cru is dry, rich, and powerful (over 13% natural alcohol) with generous spicy aromas. "We try to avoid heavy aromatics, fat-styled, and sweet Gewürztraminers," says Humbrecht, the thirteenth generation winemaker at his family's winery in Wintzenheim. "The choice of the soils and good ripeness is the key for us in Alsace."

Gewürztraminer Goldert Grand Cru is always a more delicate wine. It has rose petal aromas when young, but ages very well with more discrete aromas.

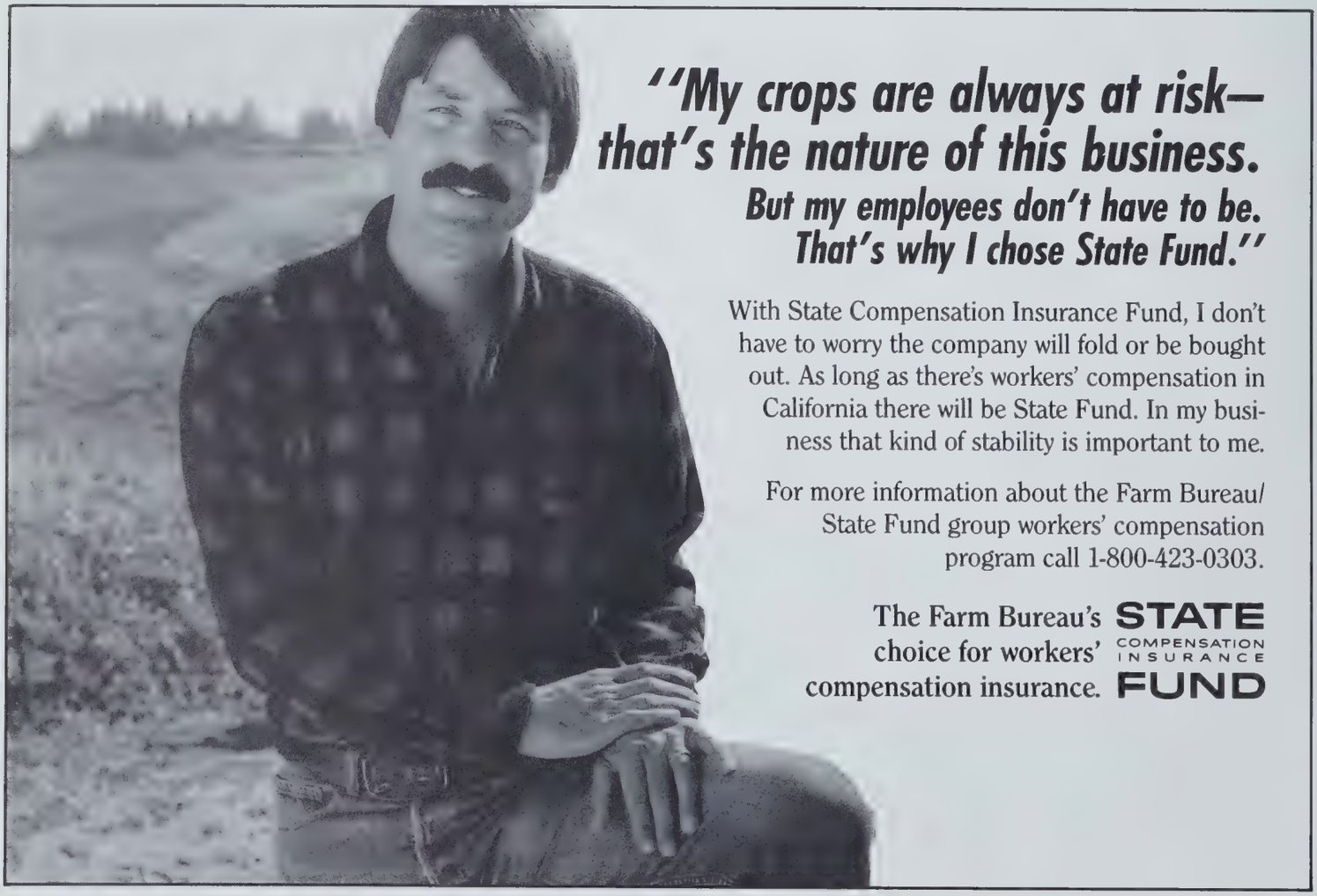
Gewürztraminer Herrenweg is light and aromatic. It shows its potential earlier and remains delicate throughout its life.

Humbrecht offers the following guide for optimal consumption in what he refers to as 'normal' years: three to six years for regular bottlings and four to 15 years for grand cru designations.

He suggests salmon, oriental dishes, terrines, Munster cheese, and poultry as food companions.

Grapegrowing

The Domaine Zind Humbrecht style of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Gewürztraminer is controlled by the vineyard soil and exposure. The vines are hillside plantings with east to south to southwest exposure on marl, limestone, and calcareous soil. In the vineyard, crop size is controlled by pruning.

The traditional Alsatian training and pruning system is used. The vines are trained vertically on four or five wires (which can be movable). Gewürztraminer vines are pruned on a double-cane guyot system with one spur.

In some very poor soils or for young vines, the guyot simple method with one spur is used. Experiments are being conducted with the Carbonneau open lyre method and cordon pruning, but the Guyot system is best suited, according to Humbrecht.

For the Gewürztraminer Hengst Grand Cru, the vineyard is at 270 to 350 metres (886 to 1,148 ft) altitude with a 30% to 60% slope in a warm, dry semi-continental microclimate receiving 640mm (25 inches) average annual rainfall, nearly 16 inches of which falls between April and October. Irrigation is illegal in France.

The soil is iron-rich with 39% active chalk and significant stone composition from one to 2.5 feet in depth. Vines from the Massal selection range in age between 35 and 50 years old and are planted 5,500 vines/hectare (2,165 vines/acre) in north/south rows. Average harvest is 45 to 60 hL/hectare.

The Gewürztraminer Goldert Grand Cru vineyard has an average vine age of 35 years and is at 300 to 350m (984 to 1,184 ft) altitude with a 30% slope. The soil is rich, calcareous, and stony. Vine rows are planted east/west and there are 5,800 vines/hectare (2,283 vines/acre).

The Gewürztraminer Herrenweg vineyard is valley floor with gravelly, alluvial soil with excellent drainage and significant stone content. The vines are 20-years-old, rows planted north/south, and there are 5,500 vines/hectare.

At harvest in mid- to late October, the berries are small with a dark pink/red color and frequently have some botrytis. Picking parameters, in order of importance, are: taste, foliage, and weather; sugar, TA, and pH; then berry color.

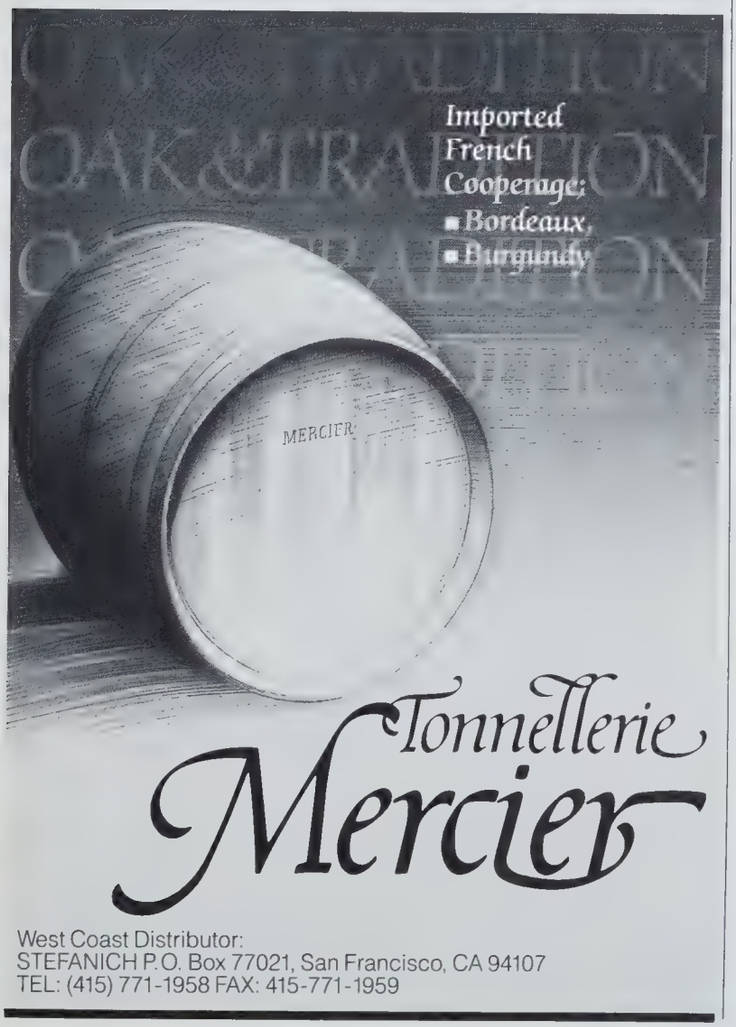
Winemaking

Hand-harvested grapes are pressed whole-cluster, without crushing and destemming. A slow, gentle press program takes six to 12 hours. The must runs by gravity directly into the cellar where it is settled for 12 to 24 hours before transfer to the fermentation cask.

SO_2 additions to the grapes and must depend on the quality of the grapes and the importance of botrytis. SO_2 additions of 3g to 6g/hL of must is typical.

Enzymes are added to the must containing 1% to 2% solids after settling. Fermentation completes with natural yeasts in temperature-controlled (68°F to 72°F) old, oak casks. (Stainless steel heat exchangers, in the shape of a flag, are installed in the middle of the cask.)

For a dry, classic Gewürztraminer, fermentation completes in five to six weeks. The wine is racked off the heavy lees a few weeks after fermentation completes. SO_2 is added and the wine stays on the fine lees in 3,000 to 10,000L traditional Alsatian casks for 10 to 11 months, until bottling. If necessary, the wine is fined.



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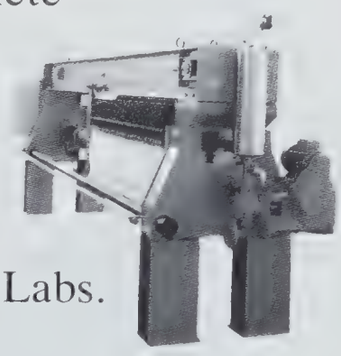

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Prior to bottling, about 14 months after harvest, the wine receives a gross filtration followed by a 2.0μ filtration. At bottling, free SO_2 levels are approximately 40 to 50 ppm.

Tasting Notes: 1987 Gewürztraminer Herrenweg

Color/Aroma: Light-medium straw. Botrytis; slightly overripe; intense citrus blossom; citrusy; mature fruit and spice.

Flavors: Echo aromas nicely; pineapple; spice; abundant fruit.

Balance/Finish: Dry and well-balanced; firm.

1987 Gewürztraminer Hengst Grand Cru

Color/Aroma: Medium straw. Honeysuckle, floral blossoms; Riesling-like; slightly grapey; citrus zest.

Flavors: Complex floral and herbal notes; ginger; lemon, orange, and lime; ripe apples; peppery spice with balanced fruit.

Balance/Finish: Medium body; high alcohol; clean and dry; excellent; lingering finish.

1987 Gewürztraminer Goldert Grand Cru

Color/Aroma: Yellow straw. Peachy, citrus, ripe fruit; floral; slight botrytis; grapefruit; toasty spice.

Flavors: Rounded entry; complex; clove-like spice; citrus, peach; 'sweet' floral flavors; melons; honey; baked apples.

Balance/Finish: Spicy; lingering; dry and balanced; slightly bitter.

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Winemaker: Don Brady

Wine Style

Llano Estacado attempts to produce a Gewürztraminer in a Germanic style. At all stages of processing, emphasis is placed on preservation of freshness and fruitiness. "Depending on the harvest, we will typically finish our Gewürztraminer with moderate acidity and residual sugar," says Brady.

"Our Gewürztraminer is a spicy wine with allspice and lemon peel aromas and undertones of apricot and peach. In some vintages, a minty character develops as an added complement. These aromas and flavors are closely related to soil and the effects of a particular growing season. To insure varietal character, we try to pick fully ripe fruit."

Because production emphasis is on freshness and fruitiness, Llano Estacado's Gewürztraminer is best consumed within one year of release which is three months after harvest.

Locally, it is a favorite on the Thanksgiving table. Its moderate acidity and light sweetness complement poultry dishes, especially when sauces and spicy condiments are used. Brady's favorites are spicy Thai and light Cajun dishes. The spicy flavors of Gewürztraminer are an excellent accent while the sweetness calms the heat of these foods.

An important factor in styling Llano Estacado's Gewürztraminer is sun exposure of the fruit. With adequate sun exposure, the fruit will be dark in color and exhibit the desired spicy/mint flavors. Shading seems to yield fruit lacking color with more citrus flavors.

Grapegrowing

Grapes comes from cellarmaster Allen Hagen's vineyard located in southeastern Lubbock County. The soil is Amarillo fine sandy loam, four to eight feet deep with

significant abundance of calcium and potassium. Lubbock County has a high desert climate at 3,200 foot elevation.

"We experience prevailing southwesterly winds averaging 12 to 14 mph," reports Brady. "Our altitude and high winds positively affect our grape quality. The growing season has an average of 4,100 degree days, but the grapes do not respond as the degree-day model would suggest."

Self-rooted vines planted in 1981 are spaced 6.5×10, planted southeast/northwest, yielding one to two tons/acre. Currently, a two-wire vertical trellis with cordons is being converted to cane-pruning to make the vines less susceptible to long-term damage from hail. Hail damage on cordon-trained vines can take three to five years to recover. Recovery time with head-trained, cane-pruned vines should be much quicker. Improved sun exposure should be an added benefit and an increase in yield is expected.

A 20-inch average annual rainfall is supplemented by a spring flood irrigation of approximately four to six inches. Bud break is mid-April, bloom is early May, veraison is the end of July and harvest is mid-August. Average number of days for fruit on the vine is 105.

At harvest, about 75% of the fruit is pink or red-colored in tight bunches that wrap around the cane. Fruit color and developed spicy flavor are the most important harvest criteria. A typical harvest window is 19.7° to 22.5° Brix, 0.64 to 0.78 TA, and 3.5 to 3.6 pH.

Winemaking

Hand-picked grapes are crushed and destemmed and transferred directly to the press. The press wine (0.5 to 2 bar) is fined with ½-lb/1,000-gal gelatin and 0.75mL Kieselsol with 2-lbs/1,000-gal bentonite for settling and added back to the free run juice.

Pectic enzyme at 50mL/ton is added when the grapes are crushed. Acid adjustment is made with tartaric acid to adjust the pH to between 3.1 and 3.2, prior to juice settling. Freeze-dried 71-B yeast is added at 2-lbs/1,000-gal. Fermentation occurs in stainless steel at 48°F to 50°F.

SO_2 at 60ppm is used as an aid to stop fermentation. Free SO_2 levels are maintained between 15ppm and 20ppm until bottling. At bottling, the free SO_2 level is adjusted to between 20ppm and 25ppm with a total between 90ppm and 120ppm. A DE filtration is done prior to bottling and sterile membrane filtration is in-line at bottling.

Tasting Notes: 1988 Gewürztraminer

Color/Aroma: Light-medium pale straw. Apple, nutmeg, honeysuckle, floral, botrytis, orange blossom and zest; spicy.

Flavors: Apple pie; sweet, fruity entry; clean, lemony; melony; youthful; floral and orange.

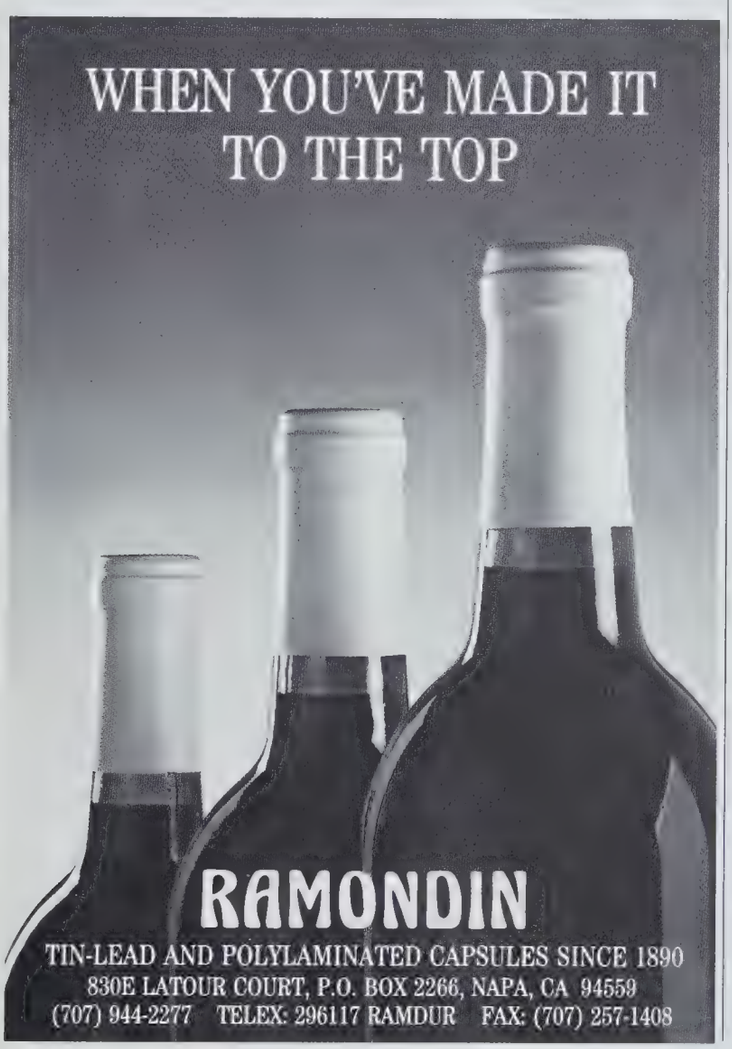
Balance/Finish: Slightly sweet; refreshing; low acid; evident botrytis.

MARK WEST VINEYARDS

Winemaker: Norman Yost

Wine Style

Production of a very aromatic, full-flavored Gewürztraminer is the aim at Mark West. "We want a wine with the significant spiciness of nutmeg and ginger with a layering of honeysuckle," says Yost. "We try to attain moderate (11% to 12) alcohol levels with residual sugar of 0.8% to 0.95%. We're looking for a balance between the residual sugar and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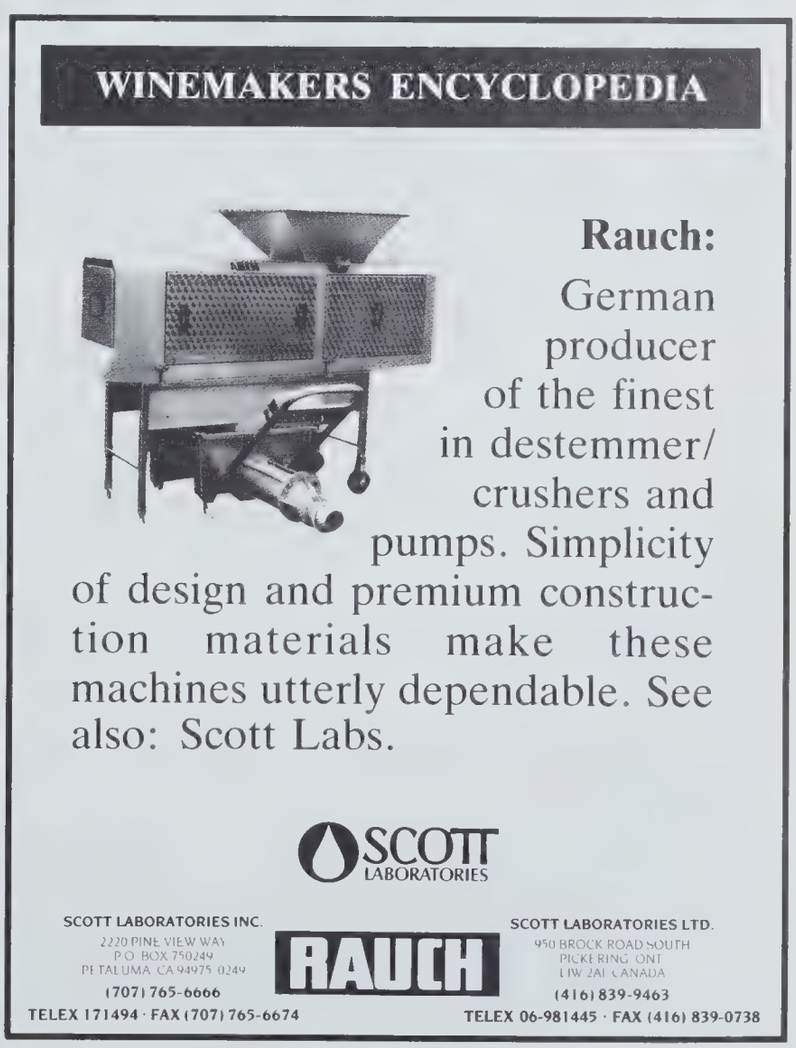
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acid to aid in emphasizing the fruit.

"Typical descriptors for the wine are: lemons, green apples, melon, creamy, steely, mild spiciness, and sweetness with crisp acidity. The spiciness of Gewürztraminer is related to grape ripeness and it is therefore necessary to harvest above 21° Brix."

Mark West Gewürztraminer is released approximately nine to twelve months following harvest. Yost contends that this allows the floral and spicy character to develop and helps enhance the body. The wine drinks optimally between two and four years following harvest.

It complements oriental dishes, Germanic foods, and some Cajun foods. Yost prefers it as a picnic wine with mild cheeses, cold cuts, fruit, and bread, but he also considers it a good match for turkey and ham.

Grapegrowing

The vineyard, planted in 1974, with AXR-1 rootstock in deep, loamy riverbed soil with good fertility, is located along the Mark West Creek that usually floods two to three times each year. An average 30 to 40-inch annual rainfall is supplemented with sprinkler irrigation twice/year.

The vine rows are east/west and vines spaced 8×12. Vines are trained on 24-inch cross arms with a fruiting wire and a cane wire. They are pruned at two to three canes/vine with eight to ten buds/cane.

Cluster thinning is done six to eight weeks before harvest to reduce the crop load to between four and five tons/acre. Leaf-pulling is done also.

At maturity, the Gewürztraminer grapes turn a cinnamon-red color. At this stage, Yost looks for the following harvest parameters: 21.0° to 22.0° Brix, 0.70 to 0.95 TA, and 3.25 to 3.40 pH.

Winemaking

The grapes are crushed and receive a 50ppm SO_2 solution. The must is given overnight skin contact before pressing. The juice is not fined before fermentation unless problems arise. If so, 1 to 2-lbs/1,000-gal bentonite is added to the juice settling tank. The clear juice is racked to the fermenter.

French White yeast from a slant is built up in the lab using apple juice. It is built up further in Gewürztraminer juice and added as 2% to 3% of the total juice volume to start fermentation in stainless steel at 50°F to 52°F.

An additional 20ppm SO_2 is added after fermentation is completed. The free SO_2 level is maintained at 14 to 17ppm. At bottling, the free SO_2 is bumped to 25ppm to 30 ppm and the total will be 75ppm to 80ppm.

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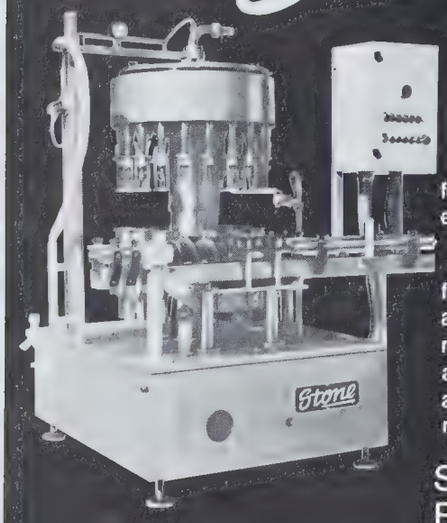

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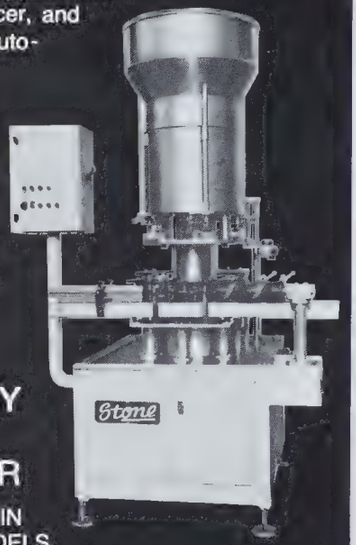

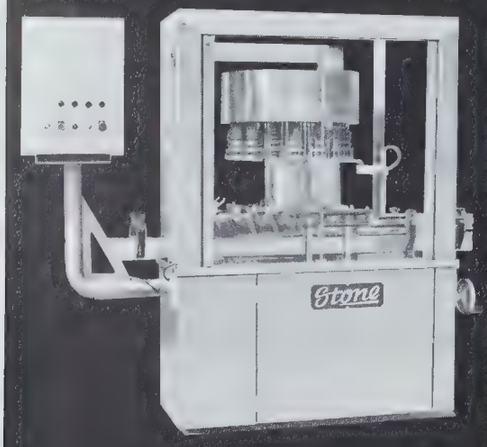

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Acid additions are done in the fermenter, prior to yeast inoculation, unless there is a settling problem. Generally, the acid adjustment is made with malic acid, but if the pH is high, the adjustment is made with equal portions of malic and tartaric acids.

Two rackings are done prior to cold stabilization. The wine is given a rough and polish filtration prior to bottling. A 0.45μ membrane cartridge is on the bottling line.

Tasting Notes: 1987 Gewürztraminer

Color/Aroma: Medium pale straw. Spicy, cinnamon, floral, Muscaty, melon.

Flavors: Grapefruit zest, lemony, spicy, mandarin orange, apple.

Balance/Finish: Round, full, spicy; some r.s., but perceived dry; tart, lively.

Co-owner: Ted Bennett

Wine Style

Navarro estate-bottled Gewürztraminer is a dry to off-dry, spicy wine with tart, complex flavors. It has aromas of quince, lychee nuts, Jasmine tea, peaches, and a delicate rose, floral spiciness. "These aromas originate from fruit ripened in a cool climate," Bennett contends.

Additionally, a four-wire trellis allows more sunlight to the fruit that develops terpenes which, according to Bennett, contributes spicy, floral aromas. Lees contact enriches the wine overall and adds light, yeasty, toasty notes.

"I think the heavy, clay soils of our vineyards contribute a hardness to the wine when young, but allow it to develop better in the bottle over a two- to four-year period," Bennett claims. "To avoid excess bitterness, we do not use press juice and to prevent stuck fermentations, yeast nutrients are essential."

Deborah Cahn, co-owner, likes to match-up the wine with spicy foods, particularly those of Hunan, Indian, and Vietnamese origins. She also suggests that it complements simply prepared white meats like turkey and pork.

The wine is best after 1.5 to three years of bottle age.

Grapegrowing

The Stony Hill scion selection was planted between 1975 and 1978 with AXR-1 and SO4 rootstock and spaced 10×6. Vines are contour-planted and terraced on a hillside location with gravelly-loam and clay soil at 600 feet elevation.

Anderson Valley is a coastal valley rated mid-region I and has a long cool growing season with morning and evening fog during the summer and very few days in the 90's. Bud break occurs about mid-March and harvest is mid- to late September.

Winter rainfall averages 30 to 60 inches/year. Depending on the time of the last rain, sprinkler irrigation will be added

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two to three times during the growing season following this typical regimen: a 3-inch application in April, early June, and late July.

The vines are trained principally on a 4-wire 'T' trellis to force vertical canopy growth leaving the fruit with moderate sunlight exposure. Two canes/vine are bowed over a wire to aid mid-cane push and develop even crop-level distribution of three tons/acre.

Several 'test' trellis systems are employed including an 8-wire vertical trellis with moveable wires to trap the foliage and keep it vertical. This is hedged to form a solid canopy. A 16-wire double vertical trellis shaped like a French lyre is trained to a quadrilateral cordon with the cordons about 36 inches apart. The canopies are trained vertically at approximately a 15° angle outwards.

Because crop level has a large degree of variation, test trials have been done with cane girdling. Three-year experiments show that if the vine is gridled 10 to 15 days before bloom, crop levels are consistent between three and four tons/acre. When girdling is done during bloom, the berry size is increased.

Gewürztraminer has overall compact clusters with a tendency to shatter or set poorly in cold, wet, and windy years. The grapes turn a deep russet color when ripe. During grape maturation, the grapes are sampled three to four times/week. Plots of °Brix, TA, and pH are made. The pH rises rapidly when the grapes approach overripeness.

Typical harvest window is 22.5° to 23° Brix, 0.75 to 0.79 TA, and the pH is 3.25 to 3.35. The grapes are usually hand-picked at night.

Winemaking

Grapes are destemmed without crushing and no SO_2 is added. Free run and press juice (up to 0.7 bar) are combined. Pectic enzyme at 10g/ton is added immediately and yeast nutrient is added at 3-lbs/1,000-gal to the fermenter. In warm years, tartaric acid is frequently necessary for acid corrections prior to fermentation.

Generally no skin contact is allowed. Skin contact experiments are being conducted in 1988, 1989, and 1990.

Inoculation at 2-lbs/1,000-gal with Prisse de Mousee or Epernay or another yeast ferment single lots of the must in stainless steel at 60°F to maintain a fermentation rate of approximately 2° Brix/day. The temperature is not controlled for the last 10° Brix when some lots are moved to 600-gal oak ovals with light lees to complete fermentation. All remaining lots are racked to ovals after fermentation with very light lees and receive one racking in the three to six-month oak ageing period.

SO_2 at 50ppm is added after fermentation is complete and maintained at 25ppm free. At bottling, the SO_2 level is between 25ppm and 30ppm free and 70ppm to 87ppm total.

Malolactic fermentation is not normally encouraged, but it was in 1985, to reduce the acidity.

For clarification, the wine is DE-filtered, then pad filtered at bottling in May or June. The wine is released in December.

Tasting Notes:

1987 Gewürztraminer Premier Reserve

Color/Aroma: light straw. Very floral, Muscat, honeysuckle, oranges, nutmeg, cloves; intense spice; hint of wood.

Flavors: Citrus, apples, spice, cinnamon, nutmeg; citrus blossom.

Balance/Finish: Full entry; round with lush middle and good balance; slightly tart; dry.

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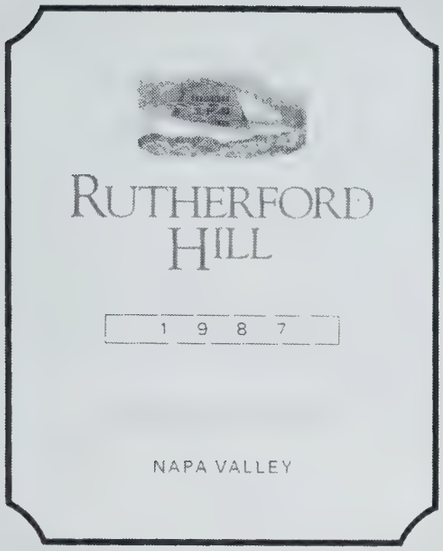

Winemaker: Jerry Luper

Wine Style

Luper's goals are the production of a dry (less than 0.80% R.S.), fruity, slightly spicy wine with honeysuckle aromatics with the alcohol level between 11.5% and 12.5%.

The wine is released one to 1.5 years after harvest and drinks optimally within two years, but will last six to eight years if properly cellared.

The wine complements any food needing a well-chilled, off-dry beverage.

Grapegrowing

The deep, clay-loam vineyard, planted 8×10 on AXR-1 rootstock about 1972 is on Oak Knoll Crossroad in southern Napa Valley. The climate is region I. Bud break is in March, bloom in May, veraison in July and harvest is usually late August.

The vines are trained on a vertical, two-wire trellis in east/west rows and yield six tons/acre. No additional irrigation supplements an average 25-inch annual rainfall.

As maturity gauges, in order of importance, Luper cites sugar, pH, TA, grape color, and taste. Harvest parameters are 20.9° to 21.4° Brix with a TA in the range of 0.75 and pH close to 3.40. The grapes are normally machine-picked at night.

Winemaking

The grapes are crushed (with the addition of a 6% SO_2 solution) prior to pressing with rice hulls as a press aid varying in amount, according to conditions. Acid corrections with tartaric acid, if necessary, are made after pressing.

The juice is settled and racked off the juice lees. Freeze-dried Montrachet yeast is added at 2-lbs/1,000-gal for fermentation in stainless steel at approximately 55°F.

SO_2 is added after fermentation. Approximately 3-lbs/1,000-gal of bentonite is added to achieve heat stability. The wine is cold stabilized.

A DE filtration follows necessary rackings. A Super EK filtration is done prior to bottling. A membrane cartridge is on the bottling line. Approximate SO_2 at bottling is 29ppm to 32ppm free and 80ppm to 90ppm total.

Tasting Notes: 1987 Gewürztraminer

Color/Aroma: Light straw. herbal, petrol-like, earthy, citrus; slight pungent perfume; slightly reduced note.

Flavors: Grapefruit, lime; lacks fruit concentration; tight; sweet citrus fruit flavors with zest in finish; rounded entry.

Balance/Finish: Slightly tart; some bitterness in finish; stylistically different; atypical style with appeal.

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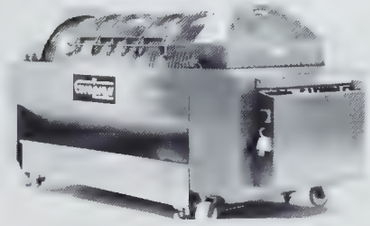

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Winemaker: Pierre Trimbach

Wine Style

The Trimbach family has been making wines in Alsace since 1626 in a winemaking succession from father to son. Pierre Trimbach is the twelfth generation winemaker at the family winery in the town of Ribeauvillé.

The Trimbach style showcases a floral bouquet, the hallmark of Alsace Gewürztraminer. The wine is fresh with balanced fruit and acidity. The finish is lean, elegant, and lingering. Gewürztraminer Cuvee des Seigneurs de Ribeaupierré (CSR) is full-bodied with great power and richness.

This style depends on fruit excellence that is achieved by controlled yield and picking as late as possible. Floral aromas are preserved by fermentation techniques.

The 'regular' wine, simply labeled 'Gewürztraminer' is released 1.5 years after harvest and has an optimum consumption in three to five years. CSR is released two to three years following harvest. It is best enjoyed in five to 10 years, but longer in the best vintages like 1983, '85, '88, and '89. CSR Gewürztraminer is produced only in the best vintages. There was no production in 1980, '84, and '87. Both Gewürztraminers are bottled in March/April following the harvest, in order to preserve the fruit and the natural acidity.

"These are versatile wines," says Trimbach. "The regular Gewürztraminer is perfect as an aperitif. Depending on personal taste, either wine accompanies curried poultry, veal, or fish. It is well-paired with saffron sauces and grilled shrimp, swordfish, grouper, or soft-shelled crabs.

"The wines are good matches with oriental and Mexican dishes. They enhance smoked salmon, trout, or duck. Regional Munster cheese and Foie gras d'Alsace are delightful companions."

Grapegrowing

The CSR vineyards in Ribeauvillé, planted with 3309 rootstock, are in the foothills of the Vosges Mountains with gentle slopes, southern exposure, and have chalky, clay soil. Additional grapes, used in the 'regular' Gewürztraminer, come from the valley floor and family vineyards in Hunawhir and Bergheim. The Vosges Mountains influence on the region makes Alsace one of the driest areas in France. Vine irrigation is forbidden in France.

The vines average 20-years-old and are planted 5,500 vines/hectare (2,165 vines/acre). Maxiumum yield is about four tons/acre. In summer, the vines are cluster-thinned to decrease yields, as necessary. Harvest is mid to late-October or later if the grapes need more ripening. "There is no rush when it comes to harvest, especially in Alsace where we have such a beautiful Indian summer," says Trimbach.

Winemaking

Some grapes are crushed and other loads are pressed directly. Pectic enzyme at 1.0g/hL is added to the juice. The juice is lightly centrifuged before fermentation with an active dry yeast of 5g/hL inoculum.

Fermentation occurs in a combination of vessels. Large, 100-year-old, wooden casks have been fitted with heat exchangers inside to control temperature. Modern,

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jacketed stainless steel tanks are also employed to control the fermentation temperature at 70°F.

The wooden casks never give any oak flavor to the wine. "We try, as much as we can, to reflect the full fruit flavors of the grapes into the wine," says Trimbach. That's why Alsace wines are so pure and refreshing."

After fermentation, the wine is racked a few times, depending on the vintage. The wine is filtered with Kieselguhr in February. Prior to bottling, the wine is filtered through a 0.65μ cartridge. The free SO_2 level is adjusted to 45mg/L.

Tasting Notes:

1987 Gewürztraminer

Color/Aroma: Light straw. Grapefruit, hint of nutmeg, grapefruit zest, piney, honeysuckle, citrus blossom, floral.

Flavors: Spicy, fresh, lively, some yeastiness.

Balance/Finish: Good fruit/acid balance, hint of residual sugar; rich, yet soft, medium-long, lingering.

1985 Gewürztraminer, Cuvee des Seigneurs de Ribeaupierré

Color/Aroma: Medium straw. Apples, nutmeg, spice, mint, cloves, floral, vinous and varietal; slight Muscat note.

Flavors: Apples, citrus zest, lively, echoes aromas, clean, but ripe fruit.

Balance/Finish: Well-balanced, slight bitterness; full but soft; long, lingering; unique style.

Owner/Winemaker: William Fuller

Wine Style

The Tualatin style of Gewürztraminer is dry. This style is controlled by shoot and crop thinning. The wine is released when the previous vintage is exhausted, which is approximately one year following harvest. Optimum consumption time is four to six years.

Fuller suggests any food requiring a dry, delicate, spicy wine as a good complement. He particularly recommends pork and spicy Chinese dishes and finds

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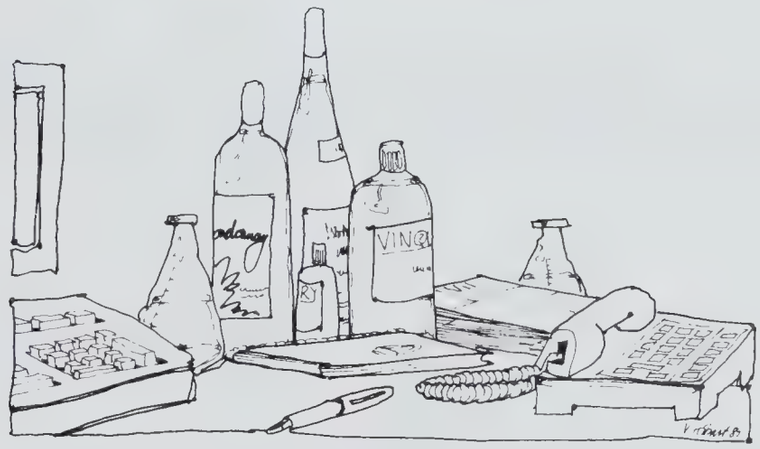

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it a pleasant accompaniment to traditional Thanksgiving fare.

Grapegrowing

Self-rooted vines, planted 7×10 in 1975, are on a south/southwest 15% to 25% slope in north/south rows in moderately well-drained Cornelius Series silt loam at 350 to 500-foot elevation. The available water capacity is eight to ten inches and the water-supplying capacity is 18 to 20 inches. The effective rooting depth is 30 to 40 inches.

The vines are cane-pruned to 0.5 buds/sq.ft. by leaving two 15-bud canes and two/two-bud spurs. The arc-cane method of training is employed. The trellis is a single vertical curtain.

In mid- to late-May, the vines are shoot-thinned to four shoots/lineal foot of trellis by removing all adventitious shoots and shoots arising from secondary or tertiary buds. During June and early July, shoot growth is positioned upright using moveable catch-wires, followed by hand, where necessary.

The canopy is topped and hedged mechanically in mid- to late-July and again in August. The crop level is adjusted, if necessary, (based on percent fruit set and/or lag phase cluster weights) to three tons/acre by cluster thinning at veraison.

It should be noted that fruit-set is quite variable. Crops on unthinned vines have ranged from one to seven tons/acre. Normally the problem is poor set. (We have tried several things to insure a more uniform set, *e.g.*, covering the vines with plastic to raise canopy temperatures, or cluster-thinning prior to bloom to improve the development of the flowering parts of the remaining clusters. The results have not been promising.)

The soil is moderately fertile. Addition of boron is required on an annual basis. Nitrogen is applied sparingly. The vineyard has a permanent ground cover (creeping fescue) in the aisles to stabilize the soil and provide competition for moisture and nutrients.

The summer is relatively dry, with 80% of the 50 to 60-inch average annual rainfall occurring between October and March. The warmer days of summer are eased by low afternoon humidity, light winds, and cool nights.

Budbreak normally occurs in early April, bloom in mid- to late-June, and veraison in mid-August.

When mature in mid-October, the clusters are medium-sized and the berries have good color. "We let the fruit hang a long time," Fuller comments. "We're making picking judgments based on grape taste and color and are not worried about sugar, acid or pH."

Winemaking

Hand-picked grapes are treated with 20ppm SO_2 solution, crushed without destemming, and pressed. The juice is centrifuged before the start of fermentation which is inoculated with freeze-dried Champagne yeast.

The wine is fermented in stainless steel tanks at approximately 60°F and is racked once following completion of fermentation. Free SO_2 levels are maintained at 20ppm in the cellar. The wine is unfined. At bottling, the wine is tight-pad filtered and the total SO_2 is approximately 125 ppm.

Tasting Notes: 1988 Gewürztraminer

Color/Aroma: Amber-hued, rose-colored. Fresh cloves, peaches, peppery; depthful spice and fruit; apple, quince, floral.

Flavors: Spicy, hot pepper; full entry; starts sweet, but finishes dry; layered fruit.

Balance/Finish: Too tart; clean and round; lacks fruit; slightly hot. ■

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Pushing wine with nitrogen

"Bulldog Pup" racking wand.

"Bulldog Pup" in use on topping keg at Joseph Phelps Vineyards, St. Helena, CA.

How do you gently handle delicate varietals such as Pinot Noir? This has long been a challenge for winemakers. If the wine is pumped, it may be roughed up and absorb oxygen. Gravity feed is more gentle, but oxygen pick-up may still be a problem.

Pushing wine gently with nitrogen can allow the grape character in the wine to continue to develop toward its full potential.

Edna Valley Vineyard in San Luis Obispo, CA had a makeshift device for pushing wine with nitrogen when racking Chardonnay and Pinot Noir barrel-to-barrel. The device had to be hand-held under pressure which made racking very labor-intensive. If the bung popped out, gas was lost and the lees were disturbed.

Don Othman of Bulldog Welding built the prototype of the "Bulldog Pup" racking wand, using a silicone bung which expanded to make a gas-tight seal that stayed in place and wouldn't pop out.

A stainless steel wand easily slid up and down through the bung assembly and stayed in any position for over nine inches of lees control. An 'O' ring prevented gas leakage from the wand and a Pyrex sight glass was installed to monitor lees pickup.

The wand worked perfectly with wine flowing 20 gallons/minute at 15 psi. A safety pressure relief valve for 20 psi was added to the Bulldog Pup, patent pending.

Today, all Chardonnay and Pinot Noir at Edna Valley Vineyard is racked with the Bulldog Pup, including movement from the barrel cellar, upstairs to the blending or bottling tank with the aid of an impeller pump.

Steve Dooley, Edna Valley winemaker, reports that the 'Pup' is used to blanket the wine during pumping. Benefits are the very gentle movement which is very simple. About four to five minutes are required to empty a barrel. The 'Pup' helps do a good job of racking off the lees.

Dooley suggests that there is reduced potential pick-up of oxygen when refilling the barrels due to presence of the nitrogen gas. "Use of the gentle Bulldog Pup helps us to add less SO_2 to the wine," adds Dooley.

Bill Parker, co-winemaker at Matanzas Creek Winery, Santa Rosa, CA, uses the Bulldog Pup at the end of barrel fermentation as the easiest way to add the five to ten gallons of wine required to top each barrel of Chardonnay or Sauvignon Blanc. The 'Pup' is also used by Parker to nitrogen-pressure rack Merlot from barrels every three months to achieve a cleaner racking than suction.

Fred Arterberry, owner/winemaker of Artberberry Winery, McMinnville, OR, uses the Bulldog Pup with nitrogen-pressure at the second racking of Pinot Noir from barrel to tank, as a very gentle way to move wine with the 'Pinot-pusher'. The 'Pup' is also used for the first racking of barrel-fermented Chardonnay off the lees with CO_2 gas to tank because the wine has no SO_2 protection yet.

Margaret Davenport, assistant winemaker at Clos du Bois, Healdsburg, CA, reports using the Bulldog Pup to top barrels of red and white wines. Some lots of Cabernet Sauvignon, with very low levels of free SO_2 in the early processing stages, are racked barrel- to-barrel with the 'Pup'.

In addition, certain lots of Pinot Noir, Cabernet Sauvignon and Merlot that have undergone malolactic fermentation in barrel, can be racked to tank, without SO_2 addition, by using the 'Pup'. This procedure can also be followed for malolactic lots of Chardonnay in barrel, although these wines are usually allowed to age *sur lie*.

Racking barrel lots to tank with the gentle action of the 'Pup' allows for uniform additions of SO_2 or acid adjustment in tank to an entire lot at Clos du Bois.

The Bulldog Pup is used at Joseph Phelps Winery, St. Helena, CA, for topping barrels of red and white wine. Gary Brookman, winemaker, says, "It is easier than using a pump, no electricity is required. It is gentler on the wine, easier to operate and less expensive than a pump. The 'Pup' is easy to clean and sterilize and the tapered bung on the wand fits a wide range of bung sizes."

The 'Pup' is used at Joseph Phelps to maintain a constant pressure of 15 to 18 pounds on the wine in the topping keg. One 2,500-lb cylinder of nitrogen typically lasts for one week of topping activity.

More than 50 California wineries use the Bulldog Pup in addition to five in Oregon, four in Washington and wineries in New York, Ohio, Virginia and five foreign countries.

The Pup's wine outlet is a slip fit for a 1-inch hose, other wine outlet options are available at extra cost. The gas inlet is ¼-inch FNPT. A 224 cu.ft. bottle of gas will push 20 60-gallon barrels of wine.

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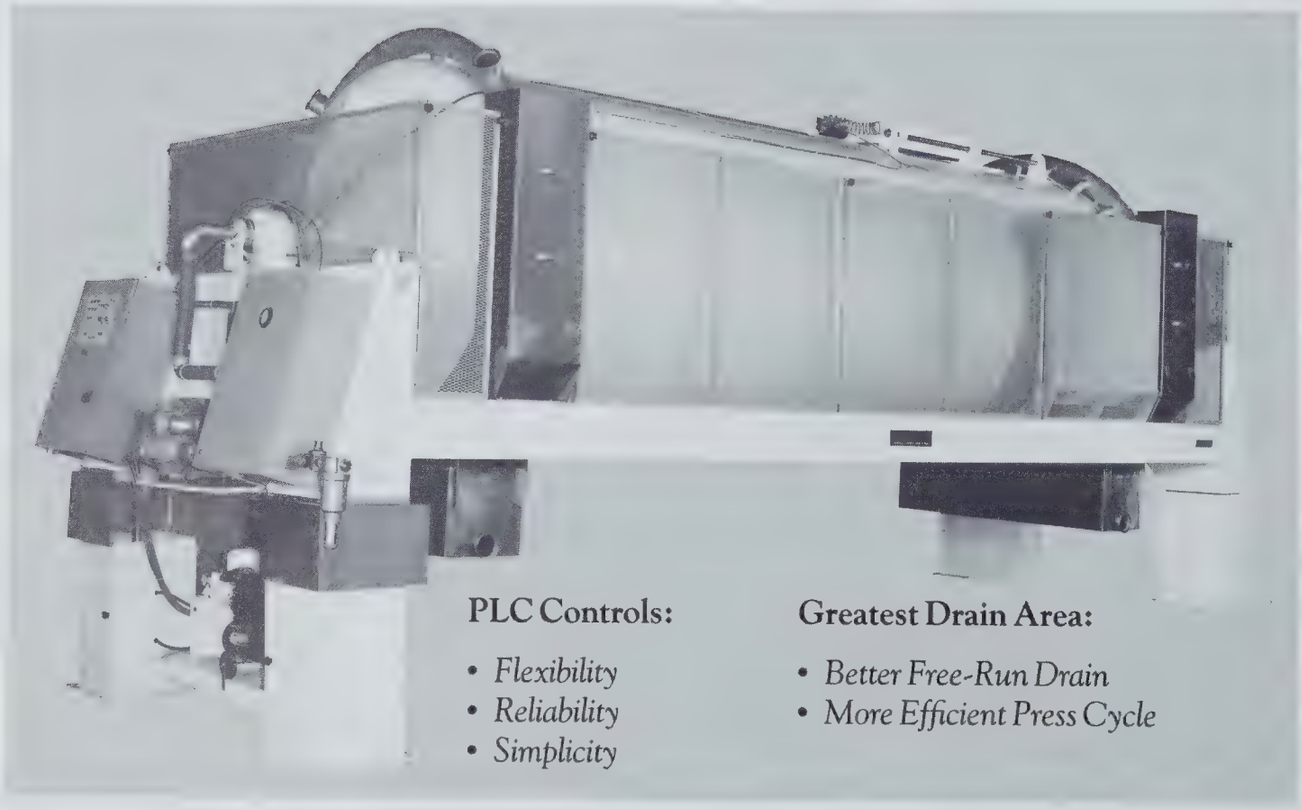

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Gewürztraminer is a world-renowned wine variety that has done much to build and maintain the fine wine reputation of France's Alsace region. It has also helped improve the credibility and prestige of newer viticultural regions in North America, New Zealand and Australia.

British Columbia is one of the more recently-established viticultural regions in which Gewürztraminer has found a home. In the Okanagan-Similkameen Valleys, where most B.C. grapes are grown, heat units vary between 950 to 1,400 Celsius degree-days, making B.C., by California standards, a cool Region I. It is an ideal area to grow this Alsatian variety, a fact borne out by the many international awards garnered by B.C. Gewürztraminers.

A unique combination of meteorological and soil conditions in the Okanagan-Similkameen make Gewürztraminer a challenge for the viticulturist. Soils are deep and coarse-textured and, in combination with the irrigation necessary in this hot, arid area, vegetative growth is often excessive. Short, cool autumns can hinder fruit maturation.

Moreover, vine spacing (1.2 to 1.5 meters [4 to 5-feet]) and narrow row spacing (2.4 meters [8-feet]) make substantial changes in training and trellising difficult to implement, except for the now well-known Scott-Henry system of vertical canopy division. These conditions often lead to excessive canopy density and fruit shading.

These viticultural problems can result in winemaking complications such as high pH and potassium, and inadequate varietal character. It is this difficulty of attaining adequate varietal character that we addressed in our research program.

Role of monoterpenes

Monoterpenes have been recognized for some time as being the primary components of muscat flavor.[4] They also are known to play a key role in determining the flavor of many wine grapes with pronounced 'floral' character, e.g. Riesling and Gewürztraminer.[13]

Monoterpenes exist in grapes in two forms: either as 'free volatile terpenes' (FVT), in which case they are odor-active, or bound, hence 'potentially volatile terpenes' (PVT).[21] PVT's are either glycosides (linked to sugar molecules) or polyols.

Polyols are usually odorless compounds containing two or more hydroxyl groups. These PVT's are thought to represent a flavor reservoir in grape berries and wines, a reservoir that can release free terpenes during crushing, skin contact, pressing, must heating, and wine ageing.

Monoterpenes are 15-carbon alcohols derived from mevalonic acid. There are several of them, and their specific aroma characteristics are determined primarily by the position of their double bonds and functional group sidechains.

During the 1960s and 1970s, several researchers utilized gas chromatography to characterize aroma profiles of muscat and other aromatically-related varieties.[2,18,20,21,23] The most prevalent terpenes identified in Muscat Frontignan and Muscat of Alexandria were linalool, geraniol, nerol, citral, citronellol, and alpha-terpineol.

Terrier and coworkers also identified glycosidically-bound linalool.[21] Schreier and colleagues found several more terpenes in Riesling, Gewürztraminer, and related varieties, and were able to use terpene composition and concentration to 'fingerprint' varieties.[18]

In the early 1980s, Williams and colleagues in Glen Osmond, Australia, identified several new terpenes and glycosides through gas chromatography coupled with headspace analysis.[24] They also noted the presence of a hitherto unknown group of flavor reservoirs — the polyols.

Williams' group of researchers has further characterized the terpene composition of Muscat and aromatic non-muscat varieties, adding greatly to our understanding of the dynamics of terpene interconversion, glycoside formation, and free terpene liberation.

Their development of a rapid colorimetric method for measuring FVT and PVT concentrations in grape berries and juices has also been of great help to viticulturists. It is a method we have used in our lab, with some modifications, for four years.[7]

In simplest terms, it is the role of the viticulturist to optimize the concentration of both FVT and PVT in wine grapes. The role of the winemaker is to encourage the liberation of the FVT through hydrolysis of their glycosidic precursors. This process can be accomplished enzymatically, by heat or acidification.[25]

Changes in monoterpene concentration during fruit maturation

Most researchers into this subject agree that many monoterpenes tend to increase during Stage III of berry growth, and then either level off or decrease in concentration once the berry becomes overripe.[1,2,21] Quite often, terpene levels in early-ripening varieties do not peak until sometime after optimum °Brix, pH, and titratable acidity are attained.[17]

With Gewürztraminer, our results indicate that maximum FVT and PVT contents can be attained in exposed berries as early as three weeks before harvest.[15] At this point, Brix ranges from 16° to 18°, pH from 3.2 to 3.4, and TA from 8 to 10 g/L. We have not observed any decline in FVT or PVT concentration in exposed fruit once this maximum level is attained.

Location of monoterpenes in the grape berry

Bayonove and colleagues reported that 40% to 50% of terpenes are found in the skins, 10% in the pulp, and 40% to 50% in the juice.[3] Later reports focused on the allotments of the glycosides as well; Versini and co-workers found large amounts of glycosides in the skins, and felt that water uptake during Stage III of berry growth allowed their re-distribution into the juice.[22]

Gunata and colleagues found 29% to 51% of the free terpenes in the skins, along with 51% to 66% of the bound fraction.[9] They, along with Wilson and co-workers, found most of the nerol and geraniol in the skins, but found linalool more evenly distributed.[27] Wilson and colleagues also found that glycosylation

Table 1. Changes in terpene content from berry sampling until beginning of fermentation in Gewürtzraminer, Kerner, Müler-Thurgau and Muscat Ottonel, 1987.

Cultivar	Sample Condition	FVT[z] (mg. liter^{-1})	PVT[y] (mg. liter^{-1})
Gewürztraminer	Berry	1.50 a[w]	2.10 a
	Free run juice	0.91 b	1.75 c
	Pressed juice	0.85 b	1.91 b
	Significance	p=.01	p=.01
Kerner	Berry	1.00	3.24
	Pressed juice	0.78	2.33
	Significance	p=.05	p=.05
Müller-Thurgau	Berry	0.77	2.23 a
	Free run juice	0.88	1.93 b
	Pressed juice	0.86	1.81 b
	Significance	NS	p=.05
Muscat Ottonel	Berry	2.78 a[w]	7.85 a
	Free run juice	1.30 b	3.62 c
	Pressed juice	1.36 b	3.91 b
	Significance	p=.001	p=.001

[z] Free volatile terpenes.
[y] Potentially-volatile terpenes.
[w] Means separated at the 5% level by Duncan's Multiple Range Test.

during fruit maturation effectively redistributed many of the terpenes between the skin and juice.

Liberation of free terpenes

Cordonnier and Bayonove were the first to demonstrate liberation of free geraniol in berry extracts after addition of beta-glucosidase.[5] Recently, Cordonnier and colleagues rated 34 enzyme preparations for their ability to release free terpenes from their glycosidic precursors.[6]

Williams and colleagues suggested that pH adjustment (downwards) and must heating would be far more effective in liberating free terpenes, as well as in converting free polyols to odor-active terpenes.[25]

In the winery, liberation of free terpenes from their glycosidic precursors is a priority for Gewürztraminer and related varieties. Many have recognized the importance of skin contact to flavor release. Versini and colleagues found skin contact effective in releasing free terpenes, but also determined that must heating had a greater impact.[22]

Marais and Rapp found that increased skin contact time and temperature resulted in higher terpene levels in Gewürztraminer wines, although low-temperature skin contact produced wines of higher quality.[11] Must heating enhanced the effects of skin contact and led to higher wine quality.[10] Our work has shown that pressed juice normally contains higher terpene levels than does free run juice (Table I).

It is important to note that the losses in FVT and PVT that occur between the berry and pressed juice stages, despite long skin contact times, may be as great as 55% (Table I). Whatever can be done in the winery to recover the aroma compounds present in the berries is thus of utmost importance.

Effect of site and viticultural practices

The impact of viticultural practices on monoterpene levels in the fruit is an important, but not extensively researched area. In Australia, McCarthy and Coombe increased PVT in Riesling by irrigation reductions.[12] McCarthy and Nicholas reported the same response in Riesling and Muscat Gordo blanco when crop level was reduced.[13] Similarly, Eschenbruch and co-workers observed an increase in PVT in Müller-Thurgau when cluster thinning and shoot thinning were employed.

Our work with Gewürztraminer flavor manipulation in the vineyard began in 1985. We looked at ripening patterns of Gewürztraminer berries in full sun, partial shade, and fully-shaded conditions.[15] It was very clear that the PVT concentration was strongly enhanced by berry exposure.

This response appears to be independent of standard harvest indices such as °Brix, pH, and TA. Shaded berries eventually 'catch up' with exposed berries in terms of sugar and acid, but not so with terpenes. Although FVT are less responsive to fruit exposure than PVT, exposed fruit still tend to have the highest FVT concentration.

Our next step was to utilize this information to help growers. Our experimental vineyard contained an extremely vigorous area characterized by a very dense canopy. The leaf layer number (LLN) was found to be 5 to 6, many times higher than the optimum of 1.5 proposed by Richard Smart.[19] We found that utilizing techniques such as hedging, basal leaf removal, and lateral shoot removal not only improved canopy microclimate, but also increased FVT and PVT levels in the fruit.[14]

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Crop level reductions obtained through cluster thinning also increased FVT and PVT. Unfortunately, we weren't able to show major differences between the wines made from the different treatments, perhaps better winemaking would have.

We are attempting to gain insights into the impact of vineyard site (Fig. 1, 2) on flavor levels of Gewürztraminer, and also are trying to see if some of our recommended practices, such as basal leaf removal, have an effect if imposed upon a wide range of canopy densities. So far, hedging and basal leaf removal seem to increase PVT (Fig. 4) even when LLN is initially low.[16] FVT have responded to hedging and 'leaf plucking' only when the canopies are initially quite dense (Fig. 3).

Although the focus of this report is Gewürztraminer, it should be stressed that terpenes are important determinants of grape and wine quality in all muscats and several aromatic non-muscat varieties. We have found, for instance, that Riesling responds well to canopy division and basal leaf removal in terms of

Figure 1

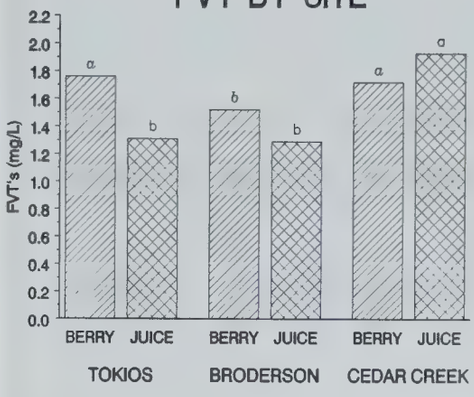

Figure 2

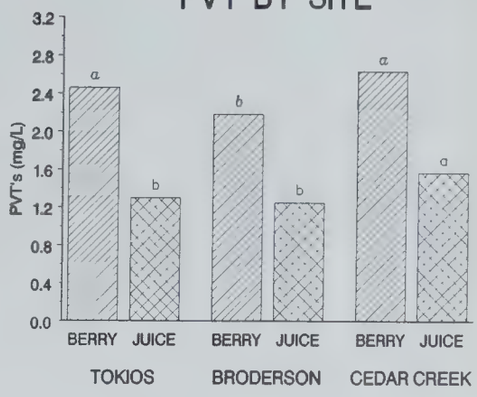

Fig.1: Free volatile terpene (FVT) content in Gewürztraminer berries and juices taken from three sites in the Okanagan Valley of B.C. Explanation of sites: Tokios (high heat unit site); Brodersen (moderate heat unit site); Cedar Creek (low heat unit site). Columns bearing different letters are significantly different at the 5% level, Duncan's Multiple Range Test. This figure was reproduced by permission from the American Society of Enology and Viticulture (ASEV).

Fig.2: Potentially volatile terpene (PVT) content in Gewürztraminer berries and juices taken from three sites in the Okanagan Valleys of B.C. See Fig.1 for site explanations. Columns bearing different letters are significantly different at the 5% level, Duncan's Multiple Range Test. This figure was used by permission from the ASEV.

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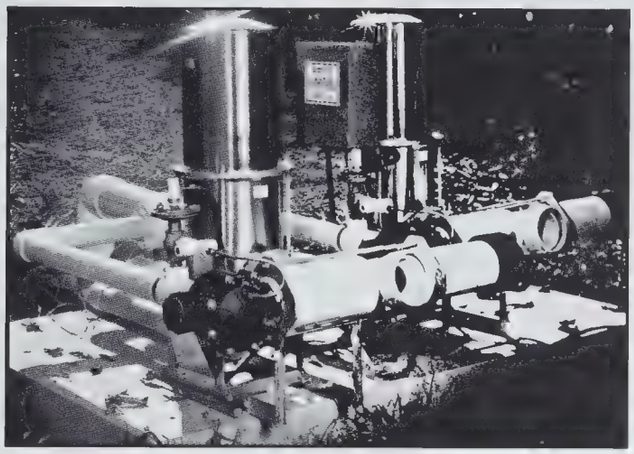

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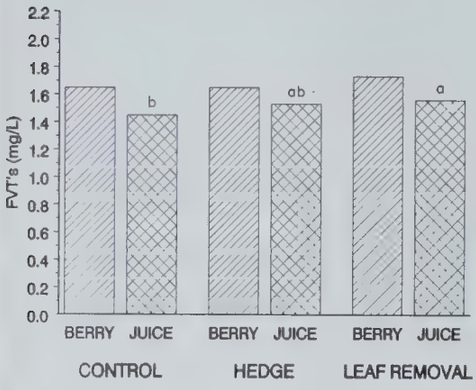

Figure 4
PVT BY
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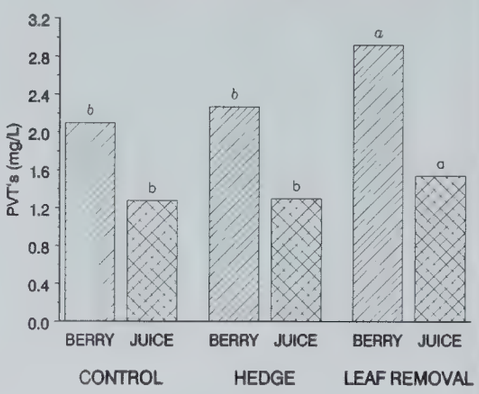

Fig.3: Free volatile terpene (FVT) content in Gewürztraminer berries and juices taken from three canopy manipulation treatments. Treatment explanation: control (unhedged); hedged (hedged to 14 leaves/shoot in early Stage I of berry development); leaf removal (basal leaves removed, both sides of the vine, 10 days after hedging.) Columns bearing different letters are signficantly different at the 5% level, Duncan's Multiple Range Test. This figure was reproduced by permission from the ASEV.

Fig.4: Potentially volatile terpene (PVT) content in Gewürztraminer berries and juices taken from three canopy manipulation treatments. See Fig. 3 for treatment explanations. Columns bearing different letters are signficantly different at the 5% level, Duncan's Multiple Range Test. This figure was reproduced by permission from the ASEV.

elevated PVT and FVT levels in the berries. We are also examining effects of leaf removal on the terpene content of early-ripening varieties such as Bacchus, Schönburger, and Siegerrebe.[17]

Despite the fact that we and other researchers have shown significant increases in FVT and PVT resulting from canopy manipulation, a major link between this response and higher wine quality has not been established.

It is important that a clear relationship be defined between terpene level and varietal intensity, to verify that our statistically significant differences are, in fact, viticulturally and enologically significant. ■

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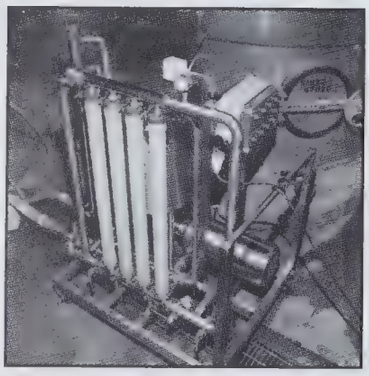

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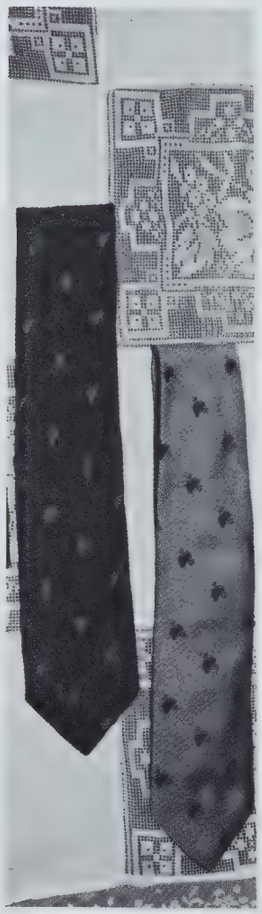

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Fetzer takes "gavertz" to market

by Millie Howie

"Gewürztraminer is a misunderstood and often overlooked wine," concedes John Law, Fetzer Vineyards vice president of marketing. Nonetheless, beginning in 1977 with the arrival of winemaker Paul Dolan, the Fetzer family has made Gewürztraminer its special province.

"Paul's style was different from the Fetzer style," says Law. "The Fetzers had been dedicated to the big, tannic reds and here came Paul making these beautiful, light, flavorful, slightly, spritzy and refreshing Chenin Blancs, Gewürztraminers and Johannisberg Rieslings . . . all low alcohol wines, 10% to 11% alcohol; with good acid, 0.73 to 0.76; 3.15 to 3.21 pH; and 2.2% to 3.5% r.s. — wines with a lot of true fruit flavor and a crisp finish."

In those days, according to Law, there were many such wines, all similar in style, quality and price. "We took the position that we could sell them all, but only one effectively," Law says. "We selected Gewürz because we liked the wine. It's very flavorful and a good food wine, with a great European tradition behind it. No one else was doing it, so it looked like a niche for Fetzer."

The first release, in 1978, was priced at $5.50/750ml bottle. Each year since, production has doubled. In 1988, 120,000 cases were produced. The 1989 vintage, bottled December 1, has a suggested California retail of $6.99, and the winery has commitments for 160,000 cases.

"When we decided to give Gewürz priority status, and establish it nationally, we took a very serious look at all the obstacles." remarks Law. "We recognized that people had difficulty in pronouncing the name, and there was a lack of familiarity with the wine. There was a real need for education, and it's taken some work.

"When we started making the push, California accounted for 90% of our sales; but then, we had never looked beyond California for support. It was always on allocation, and, by necessity, was the first wine bottled every year, because we run out of it.

"In our sales meetings we would share the excitement and success which had been generated in California, but our sales force was still busy building the Fetzer brand — doing the pick-and-shovel work.

"We started talking about it, tasting it wherever we went, showing restaurants that it was not only a viable table wine, but paired well with foods that Cabernet Sauvignon and Chardonnay did not."

"Gewürztraminer was a very slow movmoving item for us," says Mel Dick, president, wine division, Southern Wine & Spirits in Florida. "Since Fetzer has been working with it, sales have improved in many of the super-market chains and on premise. People love it, once they taste it, and we're planning to work Gewürz strongly, and build this category."

To move the wine from its marginal position as a single shelf-facing, Fetzer developed programs and promotions with point-of-purchase support to convince the trade to put case-stacks on the floor. The winery created shelf-talkers, bottle-necks, and case cards with the theme, "Just say Fetzer Gewürz." By January and February 1989, consumer take-away outside California had picked up dramatically.

"What happens with hot varieties, if we can call Gewürz 'hot'," comments Law, "is this: there's not a whole lot of room anymore for entering products, so you see one producer or a couple of producers that 'own' the business, and that seems to be what is happening with Fetzer and Gewürztraminer."

Statistics recently reported by ***Market Watch***, show Gewürztraminer sales in the under $5.00 category flat at 300,000 cases from 1987 to 1989, and in the over $5.00 category dropping from 200,000 cases in 1987, to 100,000 in 1988 before returning to 200,000 cases in 1989.

"If the above statistics are correct," says Law, "we **are** the over $5.00 category."

Fetzer uses a California appellation on its Gewürztraminer, because grapes come from many sources. Much of the fruit comes from Santa Maria Valley. But it's getting harder and harder to find Gewürztraminer grapes as acreage is pulled out or grafted over.

"We find we're dealing with many small growers with five and ten acres, while hoping more people will plant or graft more." Asked if there were a possibility Fetzer would look towards Washington state, which has an excellent reputation for its Gewürz, Law gave a quick, "No. Fetzer Gewürztraminer will remain a California wine."

Fetzer now markets Gewürztraminer through distributors in every state. "Everyone wants to sell Cabernet Sauvignon and Chardonnay," Law says, "then we come in and say, 'Hey, Mr. Distributor, concentrate on Gewürztraminer this year, have fun with it; here are the tools'."

The tools, for spring, 1990, are based on the theme, "Cuisine of the Islands," the latest thrust in a continuing Fetzer "regional cuisines" program. One back-card suggests "Savor Paradise," with Gewürztraminer featured. The materials are printed in day-glo colors and show a food spread with recipes from five of the most famous chefs involved with the cuisine of the Hawaiian Islands and the Caribbean.

Chef Tell Erhardt, better known as Chef Tell on television, contributes West Indian Curry Prawns from his "Grand Old House," located in the Grand Cayman

Islands. From Boca Raton, Chef Norman Van Aken of Hoexter's Market provides the recipe for his doubly-warm Black Bean Soup with Jalapeno-Cilantro Sour Cream.

Grilled Chicken with Pineapple Salsa and Spicy Peanut Sauce travels from Merriman's on the Big Island of Hawaii, as designed by chef/owner Peter Merriman, and from the Maui Prince Hotel, Chef Roger Dikon shares his secrets for preparing Mixed Greens with Ginger-Chili Dressing and Caramelized Macadamia Nuts.

Fifth, in the group of delicacies is Jeremiah Tower's island-inspired Tropical Trifle, as prepared by Pastry Chef Emily Luchetti at Tower's "690" in San Francisco, CA.

"Our Gewürztraminer style provides a slight hint of sweetness which supports the ingredients used in this cookery, with its influences from the cultures of all the exotic islands of the Pacific and Caribbean — things such as cilantro, ginger, chili and tropical fruits," remarks Sid Goldstein, Fetzer Food Concepts Director.

John Fetzer, chief executive officer, concurs. "As the excitement about new regional cuisines develops, increasing the daring use of a world of spices and herbs in place of heavy cream and rich butter sauces, we find that our Fetzer Gewürz complements and harmonizes with all of these, making it ideal to serve with a whole new array of foods."

The only problem facing Fetzer Gewürz these days may be one of those good news/bad news situations: good news, that everyone wants Fetzer Gewürz; bad news, that there isn't enough to go around.

For those still doubting the appeal of Gewürz, properly marketed, a couple of final statistics: during the nine-month period ending September 1989, 318 cases of Fetzer Gewürztraminer were sold in the Atlanta, GA area.

In October, at the Atlanta International Wine Festival, with 2,200 wines tasted, the Best of Show award went to the 1988 Fetzer Gewürztraminer. Between October and December, 2,153 cases were sold in the same distribution area.

"I've been a believer in Gewürz for at least 11 years," states Ryan Henpin, general wine sales manager, Empire Distributors, Atlanta, GA. "When I worked in Florida, where we could do in-store tastings, we could impact the sales with increases of 200% in any given day. Once you get people past the name, it will move, but the public just wouldn't try to pronounce it.

"Over the last year, with pushes by Fetzer and Gallo, sales have been increasing 50% to 60% in most places, and when Fetzer won best of show, it really took off. Within 45 days it was all Gewürz, with sales 500× or 600× the previous year. Now we're doing Gewürz sales within 75% of our Sauvignon Blanc sales.

"With Chardonnay pricing going up, and White Zins all over the board for quality, we're seeing an interest in varieties outside the norm. One of the beauties about Gewürz is it is very consistent, and between Gallo and Fetzer, we're having a ball."

To support his enthusiasm for Gewürz, Henpin has just designed a generic point-of-sales piece that he thinks is going to boost sales even further. It simply reads, "If you like White Zinfandel, you'll love Gewürz."

These are all good things to think about when you're tempted to dismiss Gewürztraminer as a wine too hard to pronounce and too hard to sell. ■

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The 1990 Annual Meeting of the American Society for Enology and Viticulture and Exhbition of Suppliers will be at the Los Angeles Convention Center, Los Angeles, CA, June 28, 29, and 30. More than 150 suppliers will exhibit in 122 product and service categories.

To help you plan your visit to the Suppliers' Exhibition, PWV has assembled a pre-show pictorial of exhibitors and booth numbers.

Below is an alphabetical list of exhibitors. Bold face type indicates advertisers in Practical Winery & Vineyard.

Please stop by and visit PWV-staff in booth #607.

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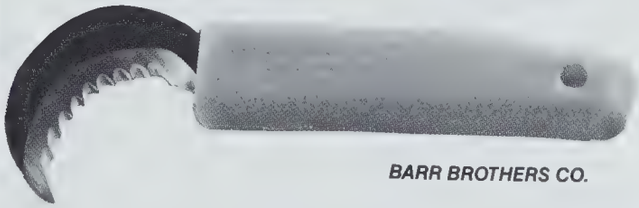

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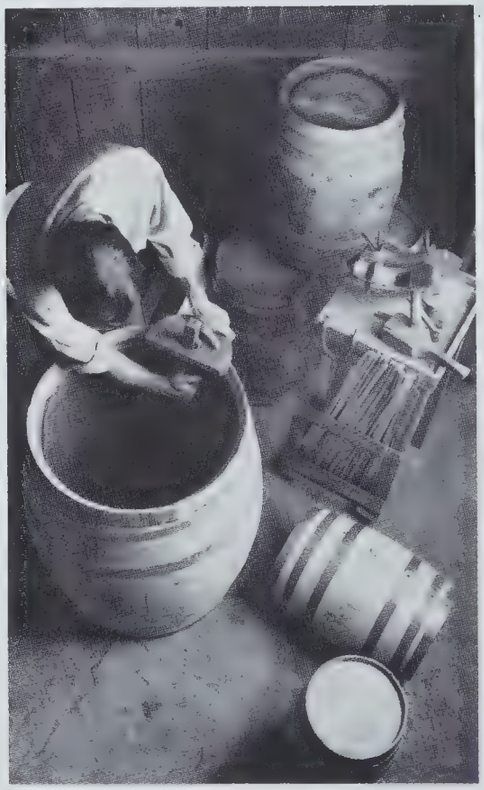

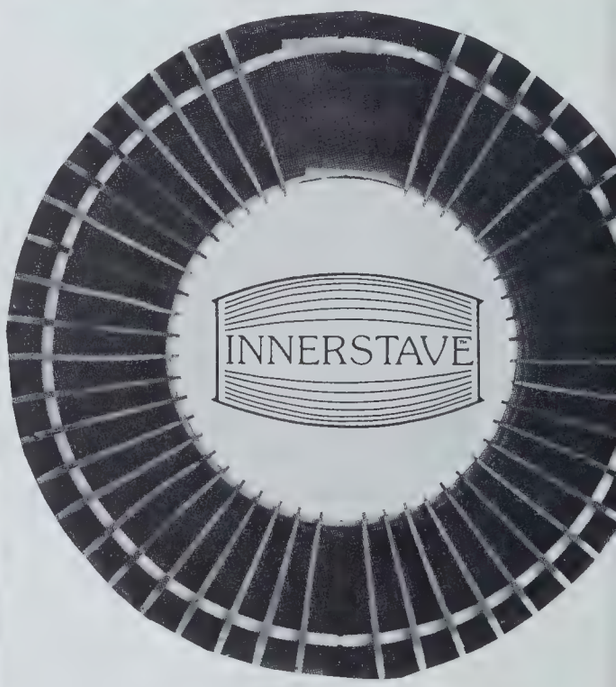

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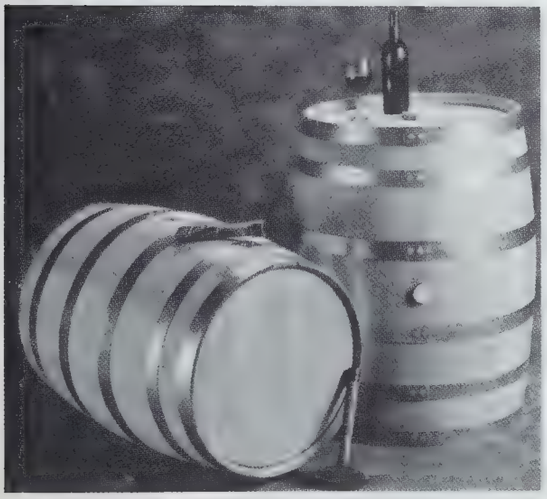

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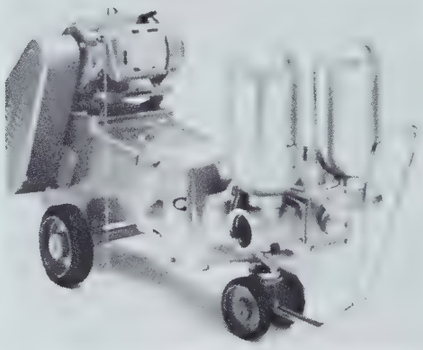

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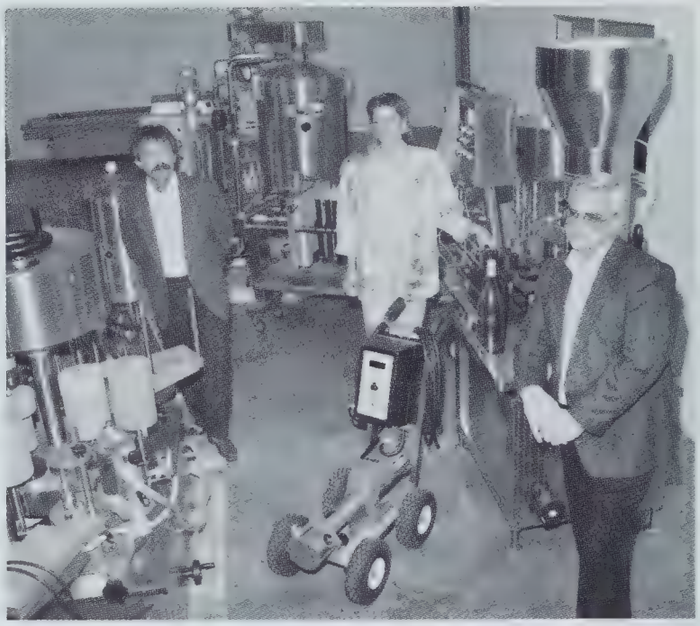

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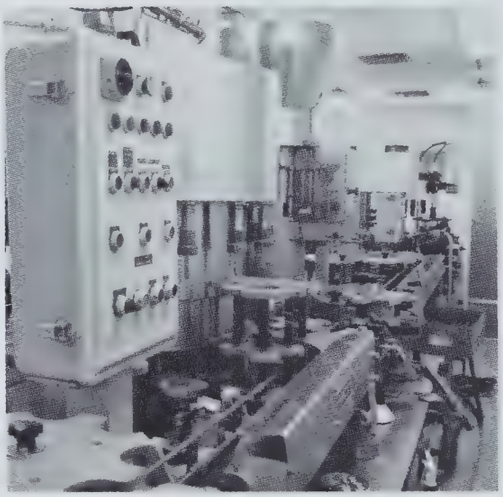

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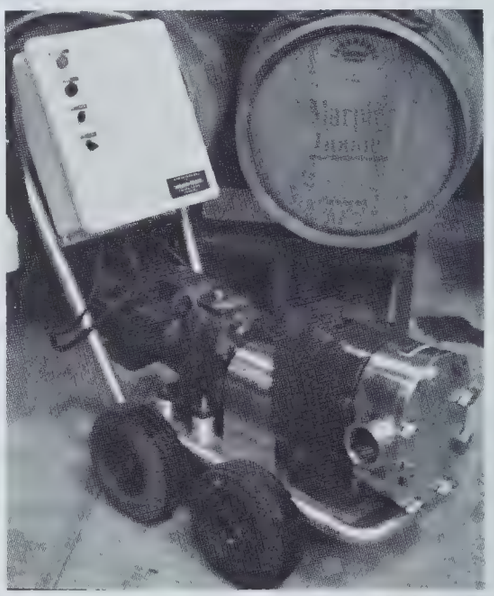

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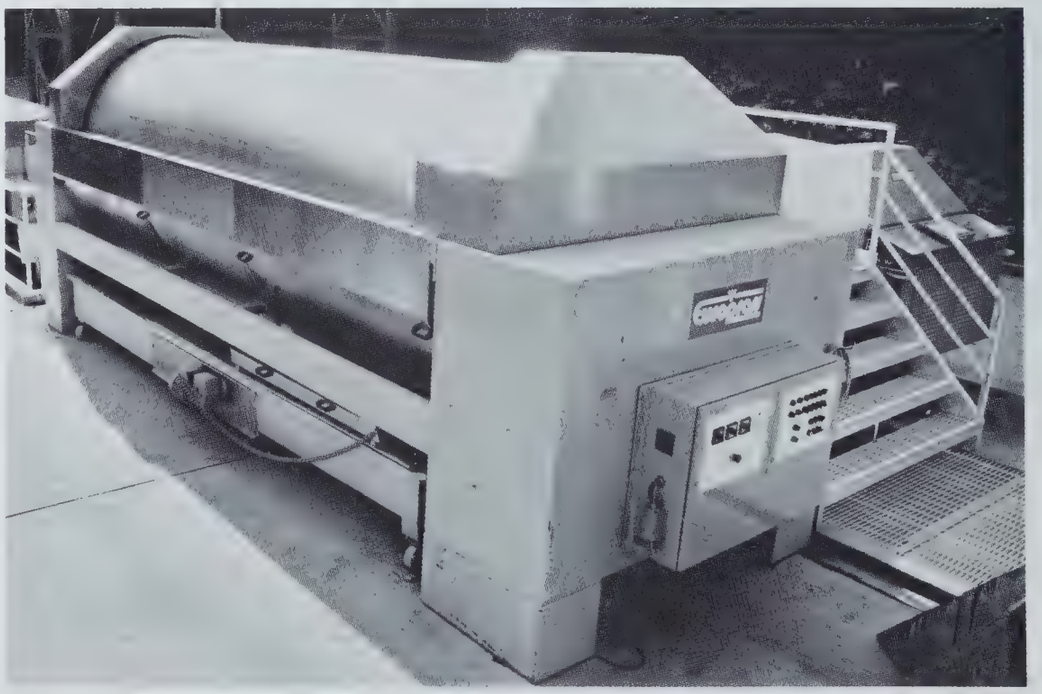

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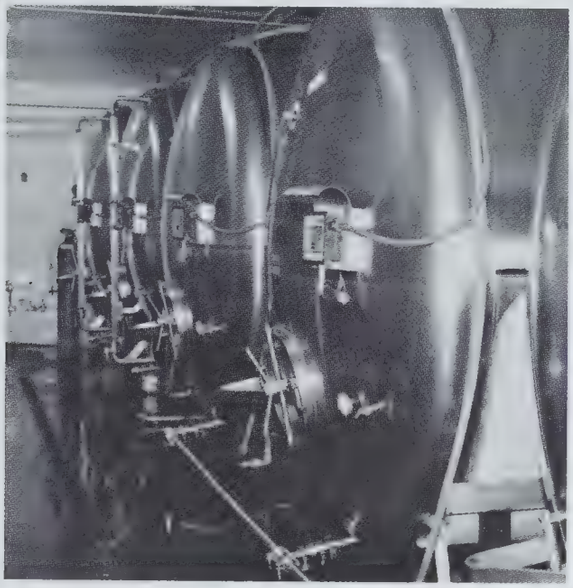

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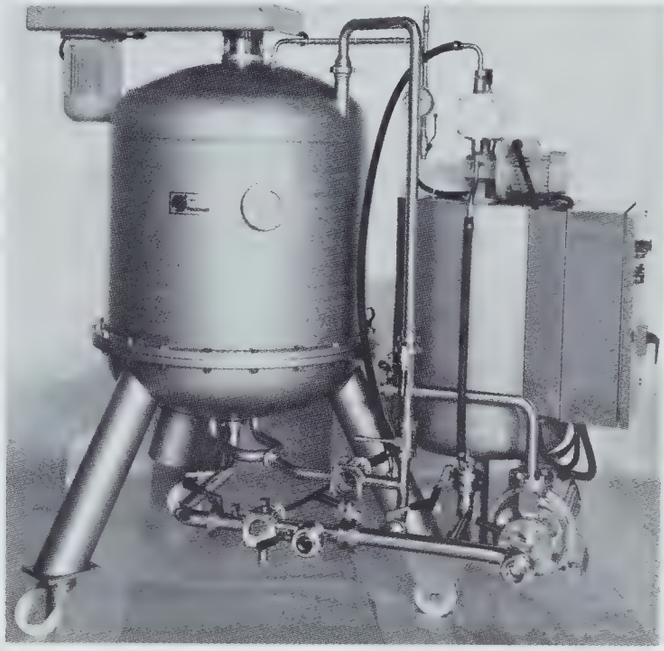

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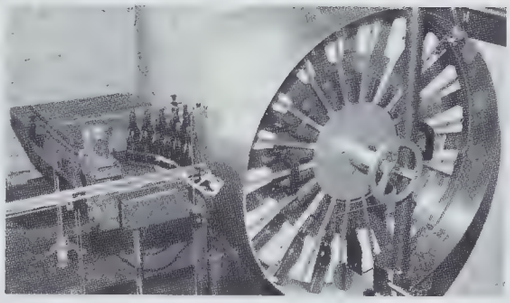

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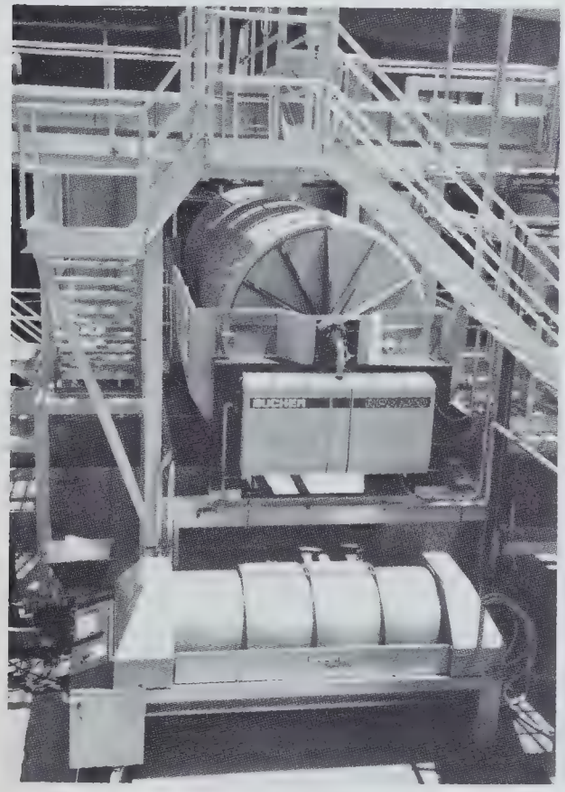

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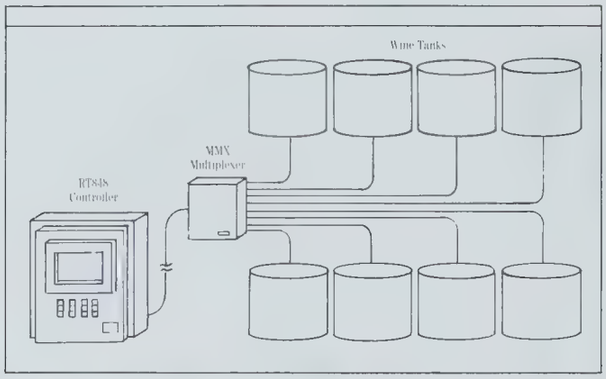

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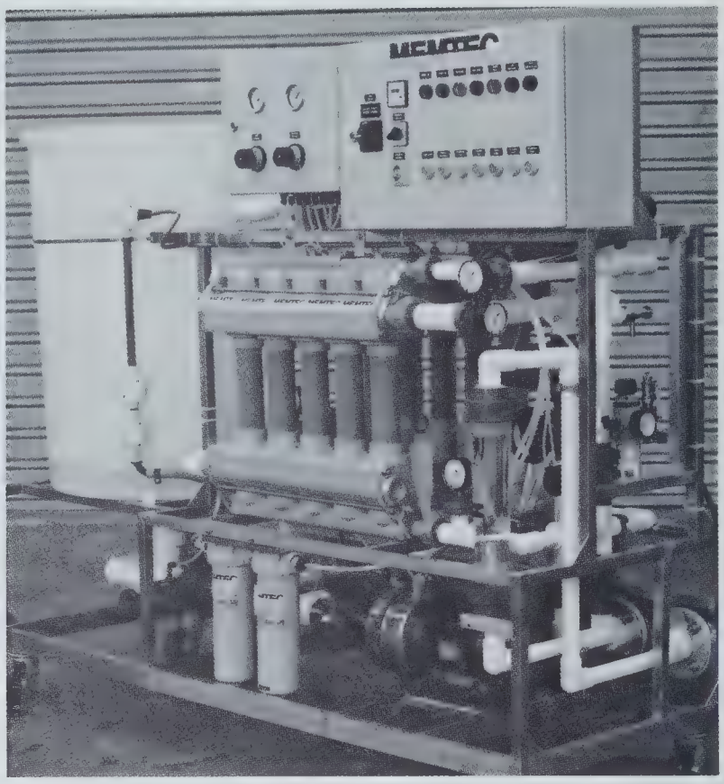

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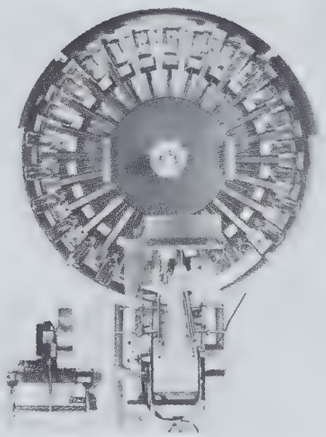

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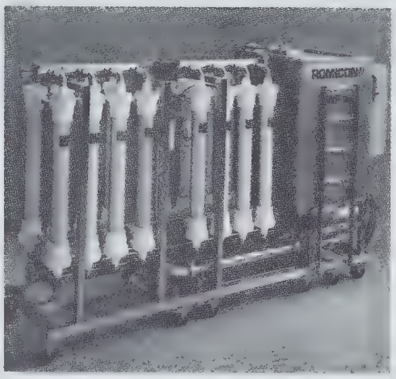

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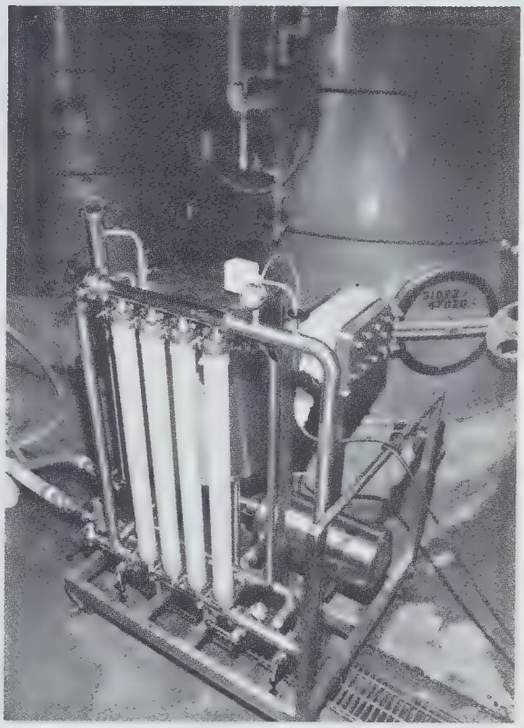

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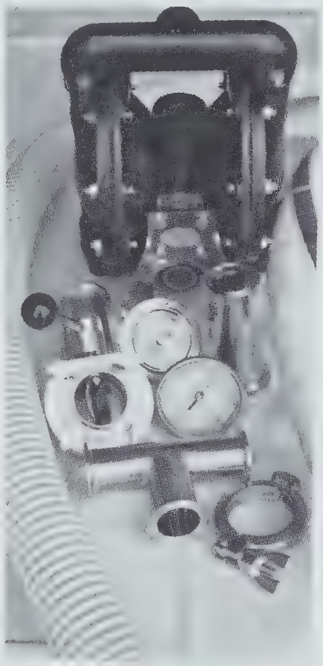

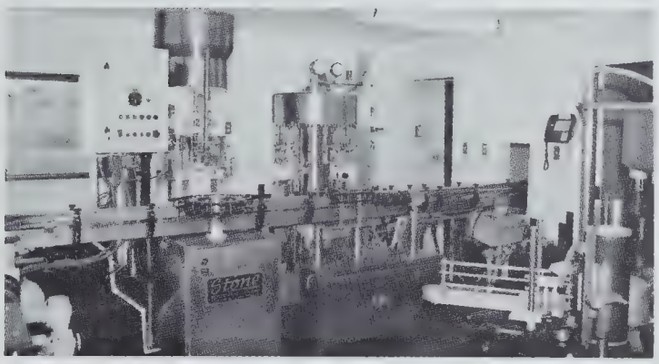

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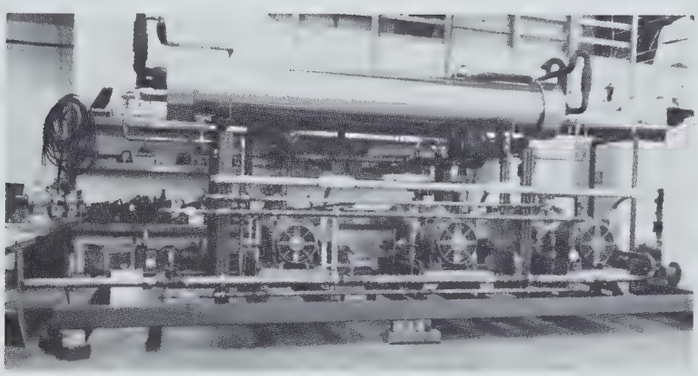

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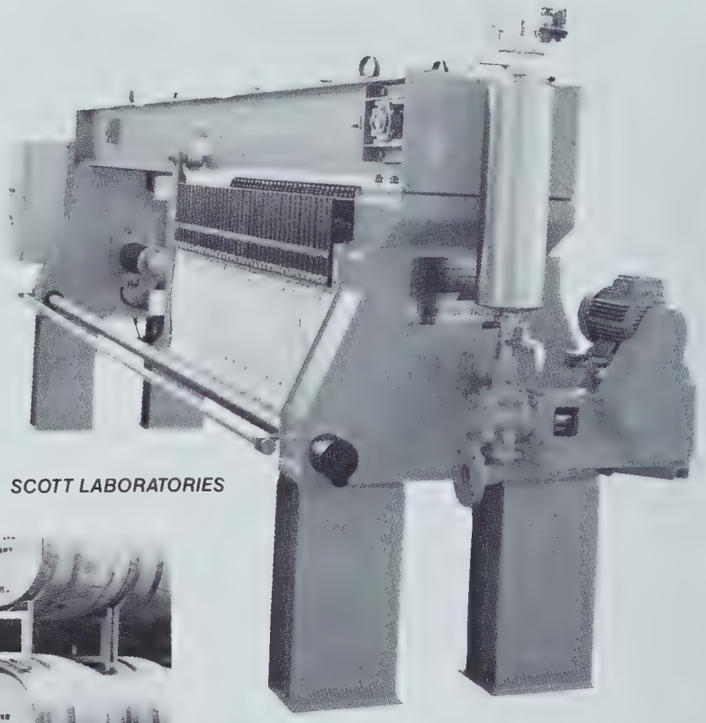

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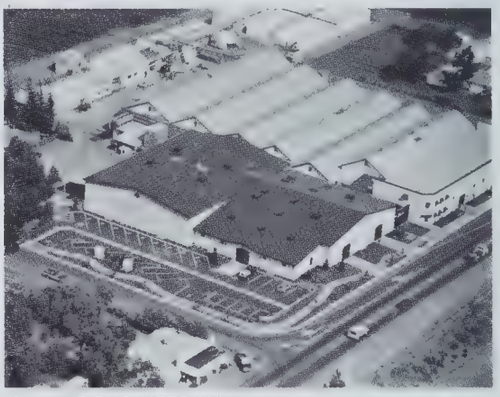

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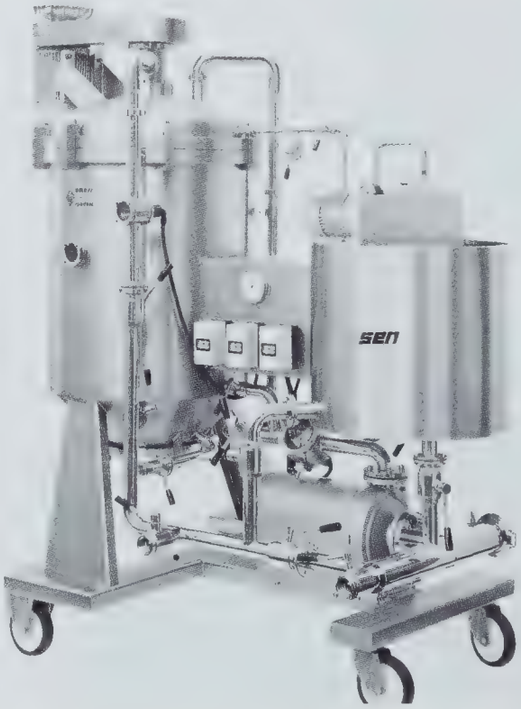

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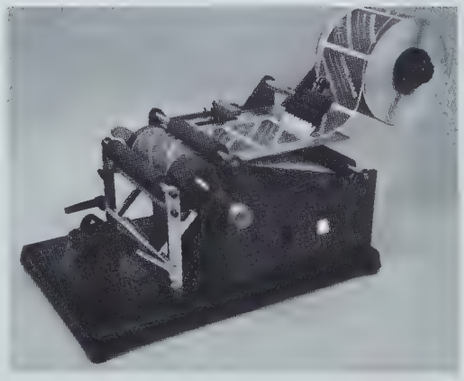

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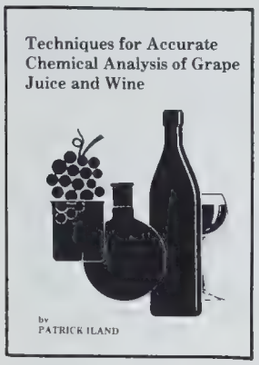

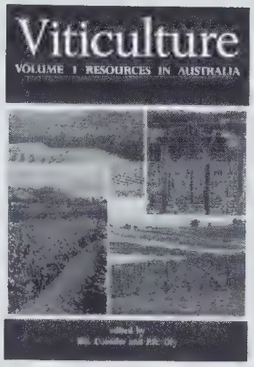

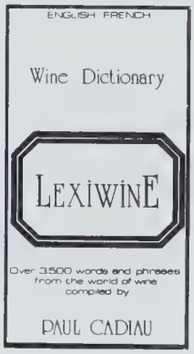

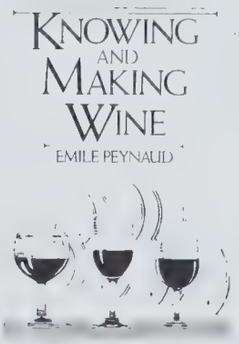

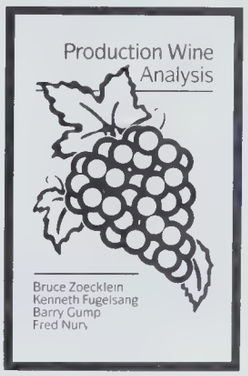

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SURVEY PART I

Méthode Champenoise

By Bruce Zoecklein
Dept. of Horticulture
Virginia Polytechnic Institute
& State University

Years of experience have enabled sparkling wine producers to refine the production technique known as méthode champenoise. However, beyond certain 'givens', there are considerable differences in both philosophy and practice among those who employ the 'champagne method'.

Stylistic decisions include many viticultural parameters, cultivars, and maturity gauges, pressing vs. crushing, press design, and press pressures. Processing variables to achieve a style include: separation of press fractions, phenol levels, use of SO_2, the oxidative condition of the base wine, yeast for primary and secondary fermentation, barrel fermentation and ageing, fermentation temperatures, malolactic fermentation, post primary fermentation lees stirring, age of cuvee, reserve wine, blending, time spent *sur lie*, nature of the dosage, CO_2 pressure, etc.

In 1989, **PWV** surveyed 30 North American méthode champenoise producers to determine production philosophy and practices. The following is the first of several reports detailing the results.

Size of the wineries was as follows: eight producing 1,000 cases or less; eight with 1,000 to 5,000 cases; two with 5,000 to 10,000 cases; and 12 (all California houses) with greater than 10,000 cases annual production.

Champagne is the yardstick by which most wine enthusiasts gauge sparkling wine palatability. Climatic regions included were quite diverse, but all represent warmer growing areas than Champagne. With the exception of the Mosel of Germany, the Champagne region is the most significant northern grape producing microclimate in the world.

Epernay, France, is on the 49° parallel, the same as the Washington/Canadian border. Total degree days in Champagne average around 1,890, as compared to 2,340 / 2,610 for Napa Valley and 2,160 / 3,600 for Sonoma County. Daytime temperatures in Napa are higher, but nighttime temperatures are cooler than in the Champagne region.

As a result of increased solar radiation, grapes tend to ripen more quickly and have the potential to reach a higher level of maturity in Napa than in the Champagne region. This is true for most other regions in California as well.

In areas with elevated summer temperatures, respondents (particularly outside of California) express concern regarding the ability to harvest early enough to retain desirable acidities and pH values while avoiding production of base wines that are heavy, alcoholic or excessively varietal. In general, warm climate sparkling wines offer more fruit and less complexity than Champagnes and develop more quickly.

It is generally accepted that a cool macro- and microclimate, allowing the fruit to stay on the vine longer while retaining desirable acidities, is important in the production of base wines which will develop the desired complexity during ageing *sur lie*.

Varietals

All but three producers listed Chardonnay and Pinot noir as their principal grapes. All 17 California producers listed Chardonnay and Pinot noir, with five also listing Pinot meunier and four listing Pinot blanc as cuvee components.

Chardonnay helps provide life, acid, freshness, and ageing potential to méthode champenoise wines. It generally provides less body than Pinot noir with aromas typically described as apple, pineappley, grapefruity, flinty, steely, and green. Warm climate and overripe Chardonnay cuvees often suffer from a narrow flavor profile, high 'melony' aromas, and lack of freshness, liveliness and length.

Pinot noir adds depth, complexity, backbone, strength, and fullness to méthode champenoise wines — what the French call 'carpentry'. It generally imparts limited fruit aromas described as rose petal, black cherry, plum and cinnamon with a tannin/spice character.

These broad generalizations become somewhat nebulous when one considers, for example, that approximately 82 different clones of Pinot noir identified to date in the Champagne viticole. Clonal identification and evaluation will continue to be an active area of research. The **PWV** survey indicates that Pinot noir is seldom used by itself — even in Blanc de Noirs.

Pinot blanc, like Pinot meunier, is a clonal varient of Pinot noir. It is somewhat neutral, but has some Chardonnay character. California Pinot blanc, like the Pinot meunier used in France, ages more quickly than Chardonnay and adds softness and roundness to the body, and length to the finish. The aromas of this varietal suggest melon, pear, marshmal-

Geographic location of Méthode champenoise producers surveyed

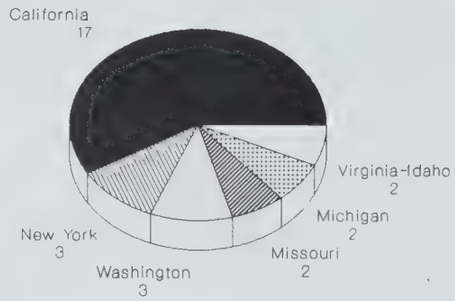
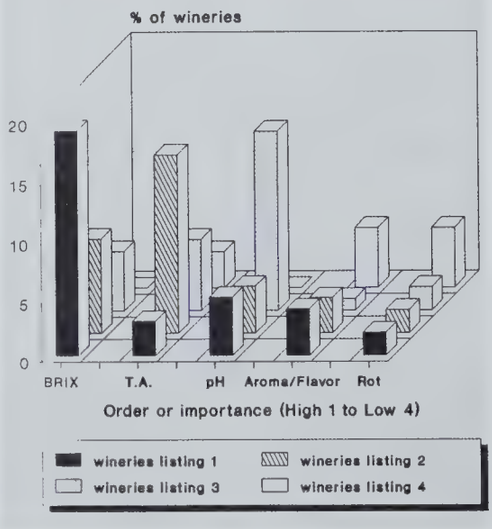


Figure 1

Harvest parameters



low, etc. It may be a desirable blending component.

Pinot blanc has a tendency to drop acid quickly on the vine and, like Pinot meunier, usually has a lower titratable acidity than Chardonnay. The **PWV** survey confirmed that, as a result it is usually harvested earlier than Chardonnay.

Fruit Maturity

The range of fruit maturity provided by the 17 California sparkling wine houses is given in Table I. Grape harvests are based upon a determination of desired style.

Table 1. Average fruit chemistry of California grapes for Méthode Champenoise*

	Chardonnay	Pinot Noir	Pinot Blanc
° Brix	17.8-21.4	17.0-20.0	16.5-17.5
Titratable Acid gram/100ml	0.85-1.5	0.9-1.7	1.05-1.1
pH	2.85-3.3	2.9-3.3	3.1-3.2

* Average of several viticultural regions.

Producers indicated that they generally strive for base wines that are clean, delicate, and varietally unassertive without being dull or lifeless. A desired cuvee is one with body, substance, and structure. The sparkle significantly magnifies the odiferous components of the wine.

Early harvest during warm seasons and in warmer climates is utilized to help minimize excessive varietal character, which can be overpowering. Several producers in warm regions outside California report that mature fruit flavors are noticeable even when sugar concentrations are quite low, *i.e.*, less than 16° Brix.

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Champage (CIVC) bases picking decisions on sugar/acid ratios — the preferred ratio being between 15 and 20. This means grapes are at optimum maturity between 14.5° and 18° Brix, with a titratable acidity of 12 to 18 g/l (tartaric). At this acidity, the malic acid is 50% to 65% of the total.

The great importance of acid may, in part, be the result of the fact that, in Champagne, sugar addition is legal while acid addition is not. Additionally, in warm climates the sugar/acid ratio of 15 g/L to 20 g/L may be reached after the development of some mature fruit flavors.

Fig. 1, (on page 50), shows the results of the PWV survey question regarding harvest parameters and their relative importance. Clearly, ° Brix, TA, and pH are the principle maturity gauges, in that order of importance.

Naturally in wet seasons, rot consideration takes on a greater degree of importance. In many regions, this often means *Botrytis cinerea*. With the development of field test kits for laccase (an enzyme produced by Botrytis which oxidizes O and P- dihydroxy phenols), the subjective element of botrytis evaluation will be reduced.

Most respondents stated that they carefully hand-harvest into small containers to help avoid berry breakage and subsequent phenol extraction. Two producers machine-harvest, one into 1-ton bins, the other into a 27-ton gondola. The remaining wineries all hand-harvest into various size containers, as follows:

11 into 25 to 40-lb lug boxes,
12 into 1/2-ton or smaller bins,
six use 1 to 2-ton bins or gondolas.

Owing to the way in which the sugars, acids, and flavonoid phenols are positioned in the grape, the juice flowing out of the berry during the early stages of pressing is usually considered better-suited for méthode champenoise production. Crushing and pressing may be conducted satisfactorily, provided the contact of the skins with the juice is minimal.

Seven producers crush grapes for MC production. Two of the producers are in California. For most méthode champenoise, however, grapes are only pressed, rather than crushed and pressed.

Lack of skin contact generally produces a more elegant, less varietally assertive base wine. Skin contact, however, releases more aroma. Coarser, undesirable components may also come through.

Crushing and pressing mixes the juice fractions, perhaps adding an additional 100mg/l phenols as compared to pressing whole clusters. In this regard, costs, the targeted market, and the style desired must be carefully reviewed.

The current trend in the sparkling wine industry is to employ thin-layer pressing. The **PWV** survey indicates the following systems are employed: tank presses by 16 producers; bladder presses by five; ram-type presses by four; continuous screw presses by two and basket press by one.

The champagne basket press, or cocquard, is still used by some producers in Europe. This unit has a very shallow maie or press basket (rarely over two feet deep) with a 10-foot diameter. The shallowness of the base, relative to its width, allows for grapes to be spread out in a fairly thin layer, reducing skin contact with the juice as it flows through the pressed mass of grapes. Thus, less pressing pressure is required.

The level of total phenols and types of

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phenols present is a function of the press design, press pressure on the grapes, grape maturity, and wood extraction. White wines with no skin contact can expect to have approximately 200 mg/L G.A.E.

The nonflavonoid fraction is relatively constant in the initial pressing of white and red grapes because these compounds are present mainly in the easily extracted juice. The nonflavonoid fraction of cuvees not exposed to wood cooperage remains about the same as the total in the juice from which it was made.

Flavonoid phenols are extracted from the skins with increased press pressure and may vary with the type of press employed. Catechins account for most of the flavor in white wines with limited skin-contact.

Vin de cuvees (first press cuts) produced by low press pressures and thin-layer presses can be low in total phenols, and particularly in flavonoid phenols, resulting in a low extract. This is an important production consideration.

In the brut style especially, finesse must be in balance with liveliness and the body of the wine. An extract of approximately 25 g/L gives body without heaviness. Moderate pressures, or combining portions of later press fractions, are methods of stylistic input that can affect, among other things, the tactile base and the aromatic character of the cuvee. The palate balance of the finished product (sweet taste ⟷ acid + astringent/bitter) is naturally affected by the phenol extraction from the grape and, possibly, from wood.

Table 2. Analysis data for four California MC bruts

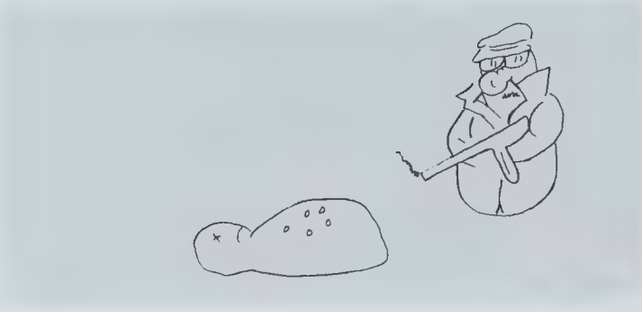
% Alcohol v/v	TA g/L	pH	Total phenols mg/l	Nonflavanoid phenols mg/l
11.7	8.70	3.03	205	200
11.4	8.70	3.01	215	205
12.4	8.40	2.98	260	255
12.3	7.50	3.22	310	300

Separation is frequently based upon taste — noting the significant drop in acidity that occurs with continued pressing after approximately 110 gallons/ton. Each fraction differs in acid, pH, and phenolic and flavor components. Data shown in Table II is for sound fruit.

In years of Botrytis and sour rot degradation greater than approximately 15% of the berries, a first press fraction of about 10 gallons/ton is also separated by many producers. ■

CURRENT STATUS

Killer Yeast



by K.C. Fugelsang[1]
and George Clayton Cone[2]

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The world of biotechnology and genetic engineering increasingly is affecting many areas of scientific inquiry ranging from human hormone synthesis to frost protection for berry crops. The pros and cons of genetic manipulation have been — and will continue to be — a hotly debated issue.

Despite the arguments of opponents, we are likely to see further research toward the development of genetically enhanced species of plants, animals and microorganisms capable of producing products tailored to meet human needs. Of late, the wine industry has felt the impact of this new high-tech biology in the area of yeast selection.

It has been known for almost 30 years that certain strains of *Saccharomyces cerevisiae* harbor foreign pieces of nucleic acid that, when expressed, code for a toxin that inhibits and kills other sensitive strains of yeast. While this type of discovery often remains the domain of academicians and others interested in pure research, identification of such a 'killer' system, coupled with the technology to manipulate expression of the gene encoding the toxin, held the promise of benefit to the winemaker.

Reports on the commercial use of 'killer yeast' in the American wine industry date back to the early 1980s. Pioneering efforts in this area are attributed to Lallemand Inc., its European affiliates, and research laboratories.

Beginning in 1968 with a single isolate expressing killer traits, Pierre Barre of the Institut National de Récherche Agronomique (I.N.R.A.), in cooperation with the Institut Cooperatif du Vin (I.C.V.), characterized the strain (then called V-86) and implemented its use in several member wineries.

After it was clear that the new isolate met the requirements of French winemakers, it was given to Lallemand for commercial production as active dried yeast. In 1980, the first ton of killer yeast (now renamed and marketed as K-1) was sold in France.

Today, Lallemand markets 18 strains of yeast with genetically enhanced killer capacities. Included among these is Lallemand Prise de Mousse (EC-1118) and K-1. This company's production of all killer yeast strains in 1988 totalled 150 tons, which is estimated to have produced over a billion gallons of wine world-wide. Other yeast producers, by comparison, have not marketed killer yeasts per se, although certain of their strains (*i.e.* Red Star Prise de Mousse) may harbor the toxin-producing property.

Since the initial species of killer yeast produced was the winemaker's old friend, *Saccharomyces cerevisiae*, its introduction into the American wine industry in 1982 by Lallemand and its distributor, Scott Laboratories, did not stimulate much interest.

Despite the seemingly ambivalent posture of American winemakers toward the use of killer yeast, literature on the subject is substantial. In the preparation of this report alone, over 100 papers were reviewed.

The short-term effect of this volume of literature on the subject was predictable — general confusion. This was illustrated by an informal poll of winemakers attending the 1989 ASEV annual meeting. Most had heard of killer yeasts (as expected, given the intensity of marketing efforts by their major supplier and distributor), but few knew how they expressed their effect, and most did not consider them relevant to California winemaking.

This review will clarify the nature of the killer yeast (friend or foe?) and, hopefully in as nonclinical a manner as possible, present the positions of those who favor their use and those with opposing viewpoints.

Historical perspectives

The presence of the so-called 'killer factor' in yeasts was first recognized and reported among laboratory strains of *Saccharomyces cerevisiae* in 1963 by Bevan and Makower.[2] The ability of the yeast to produce the toxin [when produced by one yeast strain inhibited or killed sensitive yeasts of another strain of the same species], did not appear to be inherited among progeny cells in a classic Mendelian manner.[37]

Bevan and Makower's observation roughly coincided with the recognition of non-Mendelian (extrachromosomal or cytoplasmic) inheritance in other species.

Common examples of traits not directly tied to chromosomal inheritance include acquired antibiotic resistance resulting from transmission of 'resistance (or R-factors) factors' in some medically important species of enteric bacteria. In these cases, the acquired resistance gene(s) often code for enzymes which directly inactivate compounds previously inhibitory to the microbe.

Extrachromosomal elements carrying resistance genes have spread rapidly among pathogenic enteric bacteria largely as a result of the strong selective pressure of antibiotic use in the medical and veterinary fields and today represent important concern to mankind directly through potential exposure to resistant pathogens and secondarily through the food chain.

Among eukaryotic species, (those in which the DNA is localized within membrane-bound organelles such as the nucleus), classic examples include the subcellular organelles, mitochondria, and chloroplasts.

Thus, while the killer trait has been recognized in the research and academic communities for over two decades, its importance to the world wine community has only recently received attention.

Except for engineered yeast strains in which the 'killer factor' is artificially acquired, the naturally occurring killer phenotype is widespread, phylogenetically, among the fungi. It has been reported not only to cross species lines, but also genera, families, and orders.[39,19] Thus, the presence of the killer property is widespread among yeast and not unique to those found on grapes and in wine. One species can affect other species and other genera.

The literature contains many references to inferred ecological implications of the killer factor.[27,30,39,47] One such role lies in the exclusion of competitive species from

such specific niches as decaying fruit.[38]

Hence, the expression of killer behavior is yet another way that natural selection (Mother Nature) enables one species to competitively occupy a specific niche at the expense of another. Interaction among different killer yeast strains has also been studied.[13] This will be discussed in later sections of this report.

Since the findings of Bevan and Makower in 1963, the killer property has been identified in several genera and species (and strains) of yeasts associated with either fermentation or fermentable raw materials, including some involved in winemaking, brewing and sake production.

In one study of the 'wild yeast flora' of grapes, killer yeast strains represented 17% of 157 isolates.[39] Of those wild killer strains isolated, several had killing activity directed toward *Saccharomyces*. A summary of yeasts currently recognized as harboring the 'killer factor' is presented in Table I.

Geographically, reports of killer isolates of *Saccharomyces cerevisiae* come from most of the wine-producing regions of the world including Europe and Russia,[28,1,18,25] South Africa,[41] Japan,[24] and Australia.[22,23] European studies suggest that killers may not be uniformly distributed geographically, but rather clustered.

TABLE I
Yeasts Reported as Having Killer Factor

Candida globrata,
Cryptococcus,
Debaryomyces,
Hanseniaspora,
Hansenula anomala,
Hansenula mrakii,
Hansenula saturnus,
Kluyveromyces lactis,
Pichia kluyveri,
Saccharomyces cerevisiae,
Saccharomyces (non *cerevisiae*),
Torulopsis

For example, 80% of confirmed *Saccharomyces cerevisiae* isolates from wineries in Beaujolais were found to be killers, whereas the occurrence of killers in Burgundy ranged from 1% to 20% of the isolates.[14] Recent papers by Heard and Fleet report isolation of 10 killer (and 15 killer-sensitive) strains in Australian fermentations.[22,23] The occurrence of killers in California is less well documented.[17]

As can be seen, the killer trait is widespread biologically (among yeast genera, species, and strains) as well as geographically. Work at research centers worldwide is slowly beginning to reveal the extent to which killer yeast may be represented among the natural flora present on the fruit and during the course of fermentation and to what extent their presence may influence the course of fermentation, and wine quality. Further identification of killers will no doubt be reported pending definition of proper assay systems (*e.g.*, appropriate sensitive test strains) and optimal conditions.

Biology of the 'Killer Factor'

Among the *Saccharomyces* sp., there are several classes of killers. Each will kill other sensitive strains of *Saccharomyces* while exhibiting immunity to its own toxin. Except in recently engineered strains (see page 59), both the killer toxin and host immunity to it result from the presence of a relatively short piece of extrachromosomal nucleic acid located in the cytoplasm of the yeast.[40]

For those not majoring in cell biology, the genetic material (DNA) of organisms on the evolutionary scale above bacteria

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is contained within a membrane-bound nucleus and, secondarily, in membrane-bound organelles, the mitochondria.

Killer toxin arises from the activity of an intracellular symbiote referred to as a plasmid or 'virus-like particle' (VLP). While its description as a plasmid is correct in a general sense, the designation 'virus-like particle' or VLP is now generally accepted.[11] The nucleic acid fragment is in fact not a virus in the clinical sense because the particles are not infectious.

The technical definition of a plasmid varies. We can define it physically in terms of its size (that is, by the number of base pairs that make up the genetic material), its weight (expressed in Daltons or kilodaltons), and by the nature of its genetic material.

Among *Saccharomyces* host species, the VLP's encoding killer toxins are interesting in that their nucleic acid is present as double-stranded (ds)- RNA. As a result, one may be tempted to classify it (the VLP) among the retroviruses (a group of viruses having RNA as their genetic material). However, since the plasmids is neither infectious nor does it have either reverse transcriptase nor a corresponding DNA phase, they technically do not belong within this group.[11]

Killers carry two separate linear ds-RNA's. The smaller of the two (termed the 'M' or 'P_2' genome) ds-RNA's is encapsulated in a protein coat with approximate dimensions of 33 to 35 nm.[6] Compared to the genetic material of the yeast, that of the plasmid is very small — only 1.9 kilo base pairs (kbp).

Copies of the M genome have been cloned and sequenced.[5] The M genome codes for the killer toxin as well as for cell immunity (the 'immunity factor') to its effects.[26]

The killer plasmid is not truly autonomous. Maintenance, replication, and regulation of toxin formation requires coordinated activity of host chromosomal genes.[44]

Yeasts are categorized into three groups relative to production of and sensitivity to killer toxins. Aside from (1) killer and (2) sensitive strains, (3) neutral strains that neither produce toxin nor are sensitive to it have been identified.[46]

Based upon the properties of the toxin, killer yeasts are classified into 11 groups (K-1 through K-11). Those unique to *Saccharomyces* fall into the first three (K-1 through K-3). The early work of Woods and Bevan[45] and Bussey[7] centered on characterization of the K-1 toxin.

Since production and biological activity (killing) of K-1 is optimal between pH 4.6 and 4.8, (outside the standard ranges of the grape/wine environments) it was thought that killer yeasts played no significant role in winemaking. This was the belief until recently, when K-2 toxin was described.[45,36]

Compared to K-1, the K-2 toxin is stable over a wider pH range (2.8 to 4.8) and thus is of importance in wine fermentation. To date, the nature, distribution, and importance of K-3 has not been reported, although K-3 producing yeast potentially may play a role in winemaking.[42]

Despite the fact that both K-1 and K-2 toxin producing plasmids are ds-RNA, analysis of base-pair sequences suggests little homology between them.[20] That is, they are evolutionarily distinct and distant from one another.

Sensitivity to killer toxin is generally limited to species (and their strains) within a genus, (*i.e.*, both killer or victim are of same genus and/or species.) However, killing between species of separate genera has been noted.[30,26,33,34]

Biochemistry of the K-1 toxin

This toxin is produced by the killer cell as a large (43 kilodalton) polyprotein precursor. The components of the initially inactive precursor toxin include the alpha- and beta portions (approximately 9.5 kilodaltons each), separated by a glycoprotein (21 kilodalton) component.

The active toxin is excreted (after post-translational processing) as 20-kilodalton heterodimer of alpha and beta subunits linked via disulfide bridges.[5,48]

Both K-1 and K-2 toxins appear to act at the level of the cell membrane. Sensitive strain's cell receptor sites for the K-1 toxin are beta-(1-6)—D-glucan molecules on the cell wall. In the case of other toxin producing strains (i.e.*Sacc. cerevisiae* KT-28), the receptor site appears to be in the mannoprotein fraction of the cell wall.[35] Bussey speculates that receptor recognition function resides in the beta-subunit of the secreted toxin.[9]

The evidence suggests that after the toxin binds to the receptor site on the sensitive strain's cell wall, it brings about formation of transmembrane pores and appears to operate as a proton (hydrogen ion) conductor, bringing about disruption of the electrochemical gradient across the cell membrane.[16]

The direct result is that the sensitive cell membrane becomes more permeable to

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protons. In the healthy cell, by comparison, protons would be ejected from the cell via an ATPase proton pump. In a sensitive cell membrane, this does not happen and protons accumulate intracellularly.[9]

It is not clear whether the toxin directly affects operation of the ATPase itself, or whether the numbers of protons entering as a result of increased permeability mask their transport out of the cell.[15,16] In any event, the additional 'load' placed on the cell to eject protons at the expense of ATP effectively drains or de-energizes the cell. In the latter stages of cell death, potassium excretion is usually noted.

Winemaking concerns

Utilization of killer yeasts in fermentation is viewed as having both positive and potentially negative ramifications. Optimistically, killer yeast, when inoculated into must or juice, inhibit the activity of sensitive strains of *Saccharomyces cerevisiae* (or other sensitive species) that may already be present on the grapes.

With utilization of modern recombinant technology, it may be possible to exploit these naturally occurring antagonistic interactions to create a genetically altered killer with inhibitory activity toward both the *S. cerevisiae* and non-*cerevisiae* species (or strains) known to be troublesome in winemaking.

Using such a yeast, it may be possible to control biologically (*i.e.*, inhibit) the activity of *Hansenula* sp. early in the course of fermentation and, subsequently, 'film yeasts' (*Pichia* and *Candida*) in post-fermentation barrel ageing.

The work of Hara, *et. al.*[21], is relevant in the latter regard, as they found the use of killer strains during alcoholic fermentation had residual activity during the ageing phase. Specifically, wines fermented with killers could be stored without SO_2 for up to 60 days without microbial spoilage (at 25°C), whereas parallel fermentations without killers developed film forming species when stored under the same conditions. These results are especially intriguing given current industry practice and governmental pressure to limit the levels of SO_2 used in wine processing.

The concerns often voiced regarding use of killers usually center on the potential for these strains to spread within a wine-growing region, thereby limiting the future use of specialized sensitive strains. A similar line of reasoning argues that killers may be present as contaminants among sensitive strains of commercial wine active dry yeast (WADY). Both scenarios are potentially valid.

However, in the first instance, the problem can be controlled by good sanitation practices, including monitoring of microbial activity in movements of wine between wineries (similar to the care that should be taken to prevent the spread of *Brettanomyces/Dekkera*).

Further, sanitation of tanks, processing and lab sampling equipment should be an effective deterrent to the spread of killers within a winery. Similarly, quality control at the yeast plant hopefully ensures that contamination of sensitive strain WADY with killers does not occur.

The obvious advantage of using killer strains for wine production is suppression or elimination of competitive wild flora. The selection presumes that the yeast is compatible with wine production protocol and doesn't produce undesirable byproducts. Cuiner and Gros reported no differences between fermentations carried out using killers compared with sensitive strains.[14]

In the U.S. wine industry, routine use of WADY accomplishes the goal of ensur-

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ing rapid, complete fermentation with minimal problems. However, in areas of the world which still rely heavily upon 'spontaneous' fermentations by yeast present on (or isolated and expanded from) the fruit, the situation may be quite different.

It is still unclear whether killers consistently out-compete sensitive strains of wine yeast. Heard and Fleet point out that, in some instances, killers represent the dominant flora upon completion of fermentation, whereas in other cases their numbers are relatively low.[22,23] The factors regulating the interaction are not yet reported.

As to whether naturally occurring (wild) killers represent a significant problem in regard to inhibition of fermentation, Radler reported that in grape wine fermentations, initial killer populations of at least 10^5 CFU/mL are necessary.[31] This estimate is based upon the assumption that a single killer produces only 1/100 of the toxin needed to kill sensitive cells. Thus, based upon numbers only, there is the remote potential for problematic fermentations arising from the presence of killers as contaminants.

The literature also reports many instances where the presence of killers resulted in stuck (sluggish) fermentations. Studies from the brewing industry report that killer-induced stuck fermentations arose if the initial number of killers exceeded 3% of the total viable cell population in starter cultures.[27]

Tredoux reported that when the killer population was less than 2.5%, they had no effect on fermentation rate or completion.[41] Barre also concluded that killers must comprise more than 2% of the pre-fermentation total yeast population for them to represent the dominant flora upon completion.[1] Heard and Fleet found no killer activity when the ratio of yeast sensitive to killers were greater than 10:1.[22,23]

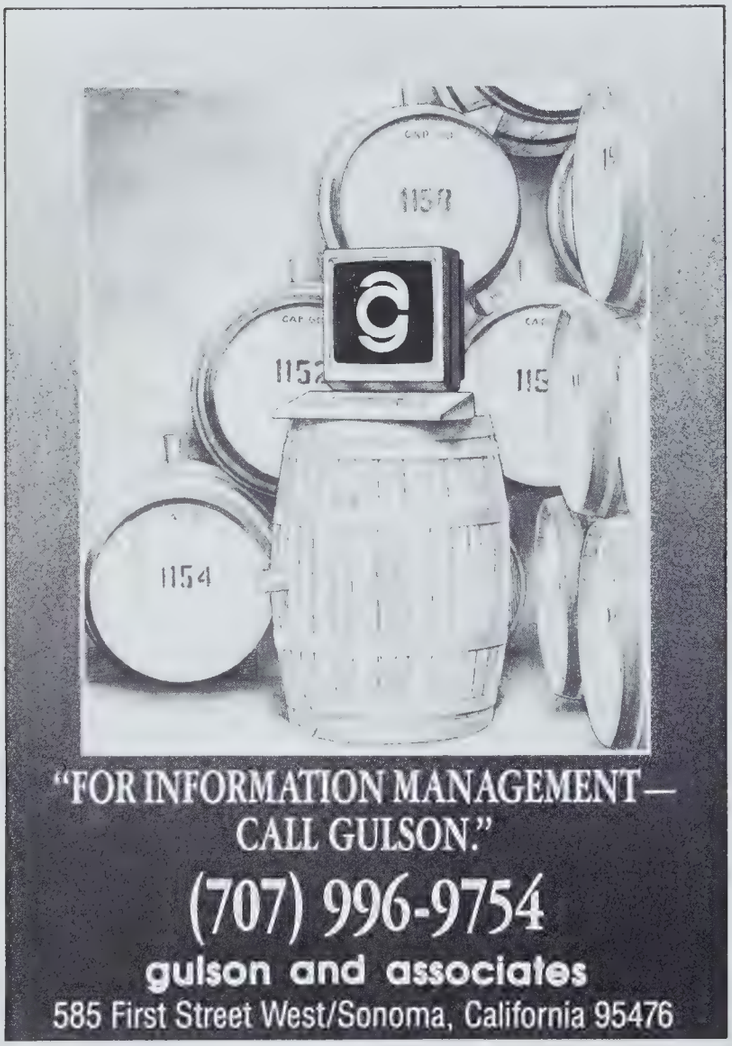
However, at killer-to-sensitive ratios similar to those reported in the above studies, Hara did find a measurable killer effect.[21] Van Vuuren and Wingfield reported the isolation of K-2 killers from five stuck fermentations in South Africa. Samples were collected from each vintner and killer strains isolated.[42]

Laboratory fermentations using these isolates versus the same sensitive strain (*Saccharomyces cerevisiae*, Geisenheim) used in the stuck commercial fermentation were followed. Viable cell counts from co-cultures produced the same results, *i.e.*, decreased viability of the sensitive strain (in the presence of killers) and, hence, decreased fermentation rate.

Mortality rate of the sensitive strain after three days of fermentation at 20°C was 70% as compared to control pure fermentations of sensitive strains, where it was less than 3%. Control fermentation completed at four days (20°C), whereas fermentations with co-cultures of killer and sensitive strains took more than six days.

Van Vuuren and Wingfield conclude by recommending that neutral (insensitive) yeast strains be used as inocula or as re-inoculum in commercial fermentations, or as a remedial action if sluggish/stuck fermentations result from killers.

The substantial variation between these results presented in the literature can, in part, be attributed to experimental conditions (substrate, pH, temperature, etc.) as well as to the heterogeneity between killer and respective sensitive strains and the toxins produced.



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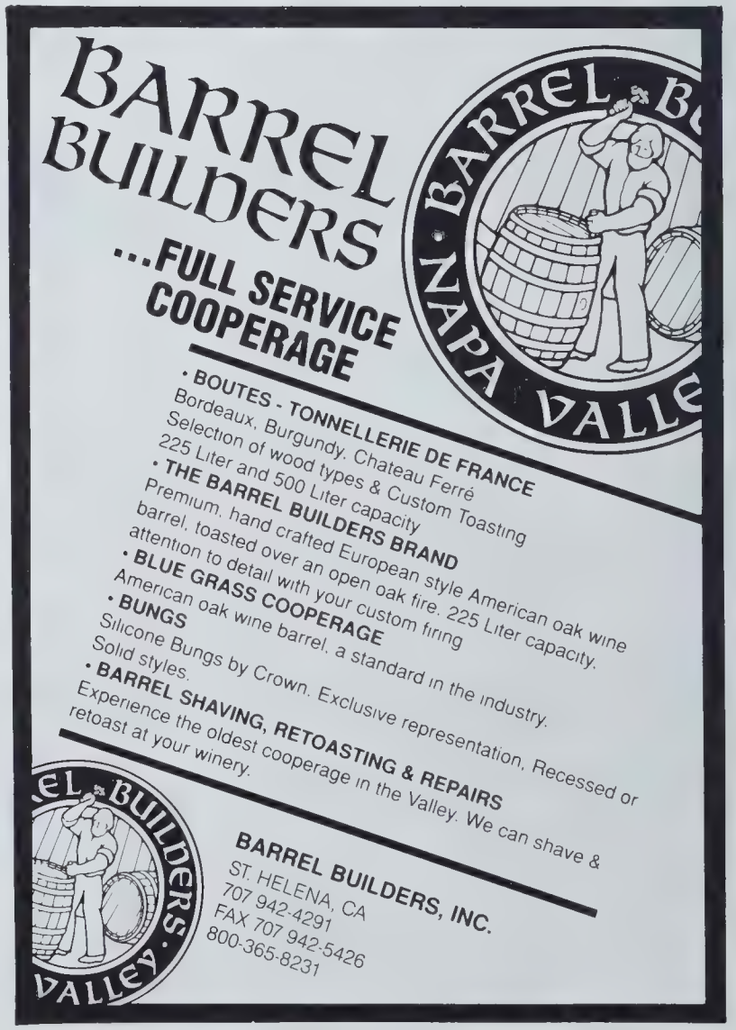
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Since killer toxin is largely protein in nature, the potential for removal by use of fining agents has also been explored. Radler and Schmitt reported bentonite additions (as calcium bentonite) as low as 1% (w/v) were effective in absorbing virtually all the toxin produced by the *S. cerevisiase* (KT-28) killer strain tested.

Concommittantly, must protein levels were also reduced by 92% at this addition level. At lower use levels, less protein (toxin and grape) is removed. Based upon these observations, they suggest that bentonite may effectively be used to prevent potential fermentation problems resulting from killer toxins.

Further, they found that additions of yeast hulls at levels ranging from 0.5% to 3% brought about a reduction in toxin activity from 15,900 units/mL (untreated control) to 60 units/mL at the highest application level. Also, addition and removal of viable yeast was shown to be effective in reducing toxin activity.

Among laboratory strains of killer yeasts, host chromosomal mutations ('ski-1' through 'ski-4') which lead to over-production of killer toxin have been described. Yeasts with these mutations are called '**super killers**'. In the case of one mutant ('ski-5'), toxin formation was increased approximately 10-fold over that seen in wild types.[12]

A second group of toxin overproducers has also been identified. The so-called 'kre-1' (**k**iller **re**sistant) mutant results from a lesion in the gene coding for a component of the beta (1→6)-D-glucan synthesis and thus have a defective cell wall receptor for the killer toxin. The altered cell wall structure of the **K**re-1 mutants results in over-secretion of protein toxin.

Aside from the academic importance of elaborating the mechanism of toxin secretion, these mutant strains are potentially important sources of killer yeasts for industrial applications, because they are resistant to many toxins.

Reliance on extrachromosomal, plasmid or VLP-based killer activity has the inherent disadvantage that the expression of this behavior (*i.e.*, the VLP) may be lost upon repeated replication of the host cell. Thus, stable incorporation of toxin-coding gene(s) directly into the yeast chromosome represents a major technical improvement in ensuring that future generations of yeast will carry the appropriate gene.

Using recombinant technology, researchers have been successful in the stable integration of the K-1 killer gene into the K-2 killer chromosome.[13,4] The new strain produces both K-1 and K-2 toxins and is immune to the activity of both. Results of laboratory fermentations (looking at both fermentation rate and sensory measurements) suggest that the newly engineered killer does not significantly vary from the parent strains.

In this regard, the work of Boone *et.al.* is particularly important, because the new killer gene(s) produced in the course of their research consists solely of yeast DNA.[4] The issue of engineered metabolites arising from expression of bacterial DNA within a host eukaryote (*i.e.*, yeast) system may well raise future concerns from consumer groups and governmental regulatory agencies.

Even though killer yeasts may be of importance to winemakers throughout much of the wine-producing areas of the world, the question of whether they are relevant to the American wine industry has largely not been answered — or even

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addressed — to this point.

Certainly, part of the ambivalence of the American industry towards killers comes from the fact that naturally-occurring populations of killers have not been substantiated in the U.S. Thus, the competition that European and South African winemakers observe between killer and sensitive strains is not seen.

Coupled with this is the fact that most U.S. producers use yeast inocula (some of which may already carry killer genes) rather than rely on expansion of naturally-occurring vineyard flora, which may represent a mix of killer and sensitive yeast strains.

However, the potential role of killers in biologically controlling undesirable yeast arising from the vineyard or during wine production and ageing should stimulate interest among winemakers.

In this regard, Bruce Zoecklein at Virginia Polytechnic Institute reports that naturally-occurring populations of *Saccharomyces* sp. are associated with sour rot complex in Virginia. He feels that killers have definite application and, further, that development of strains with killing capabilities that cross species and genus levels is of particular interest.

In the final analysis, it is the opinion of the authors that the decision to use or not to use killer strains must be based rationally upon wine production goals and not upon fears of rampant infection throughout the winery or wine-growing region. As discussed within the body of this text, such fears, although potentially valid, can be mitigated by careful attention to sanitation and microbial control.

Like it or not, yeast-expressing killer phenotypes (whether natural or acquired through biotechnical means) are probably here to stay. As mentioned in the introduction, 18 of 39 strains now marketed by one major yeast producer have the killer phenotype.

As the numbers of commercially-produced killer strains increase, killer activity will likely be viewed as yet another ancillary feature, along with routinely accepted attributes such as temperature and alcohol tolerance, low H_2S production, agglomeration, foaming, and positive flavor contributions.

Acknowledgements

We would like to thank Drs. Howard Bussey of McGill University and C.J. Muller of C.S.U. Fresno for their review of this report. ■

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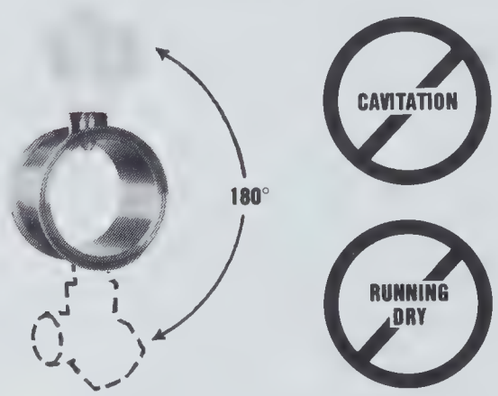

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Lighting for the winery

By Ken Arthur
Arthur Engineering, Inc.

Lighting in the processing area of a winery is, without a doubt, the most difficult task a lighting engineer encounters. It is not difficult to design a totally functional and adequate system — that is easy. The challenge is trying to satsify aesthetic criteria at the same time.

If engineers alone were responsible for determining 'what looks good', the task would be greatly simplified. But it is 'your' winery, so the challenge is finding something that looks good to you.

Besides looking good, a lighting system has to be functional for the space it illuminates, capable of surviving in the winery environment, energy efficient, simple and inexpensive to maintain, available at a reasonable cost, and, most challenging, capable of 'looking good' throughout the life of the winery.

The bad news is there are very few commercially available lighting fixtures that meet all of the above requirements.

I think the task of designing an effective, good looking lighting system for a winery processing area is as much a learned art form as it is an engineering design task. I will discuss the features of a good lighting system: lighting color, lamp characteristics, fixture types, fixture quality, and effective utilization of the system.

Need for light

There really are only two reasons for installing a lighting system: the physical need to make the task of seeing as accurate, fast and effortless as possible, and the need to create light of a distinct character, in order to influence the emotional response of those required to work in the atmosphere created by the light. Seems simple enough — right?

See-ability

The ability to 'see' a task varies, of course, from person to person. Eyesight is a factor. High contrast objects, low contrast objects, the detail required by the task — these variables also affect our ability to 'see'.

Since we cannot design a lighting system that is tailored to each person who will work in an environment, we strive for a balance between minimizing costs and maximizing benefits.

The value of a lighting system is based on its benefits in relation to its costs. The benefits include greater productivity and fewer accidents, the results of faster and more accurate seeing, better housekeeping and improved morale and motivation.

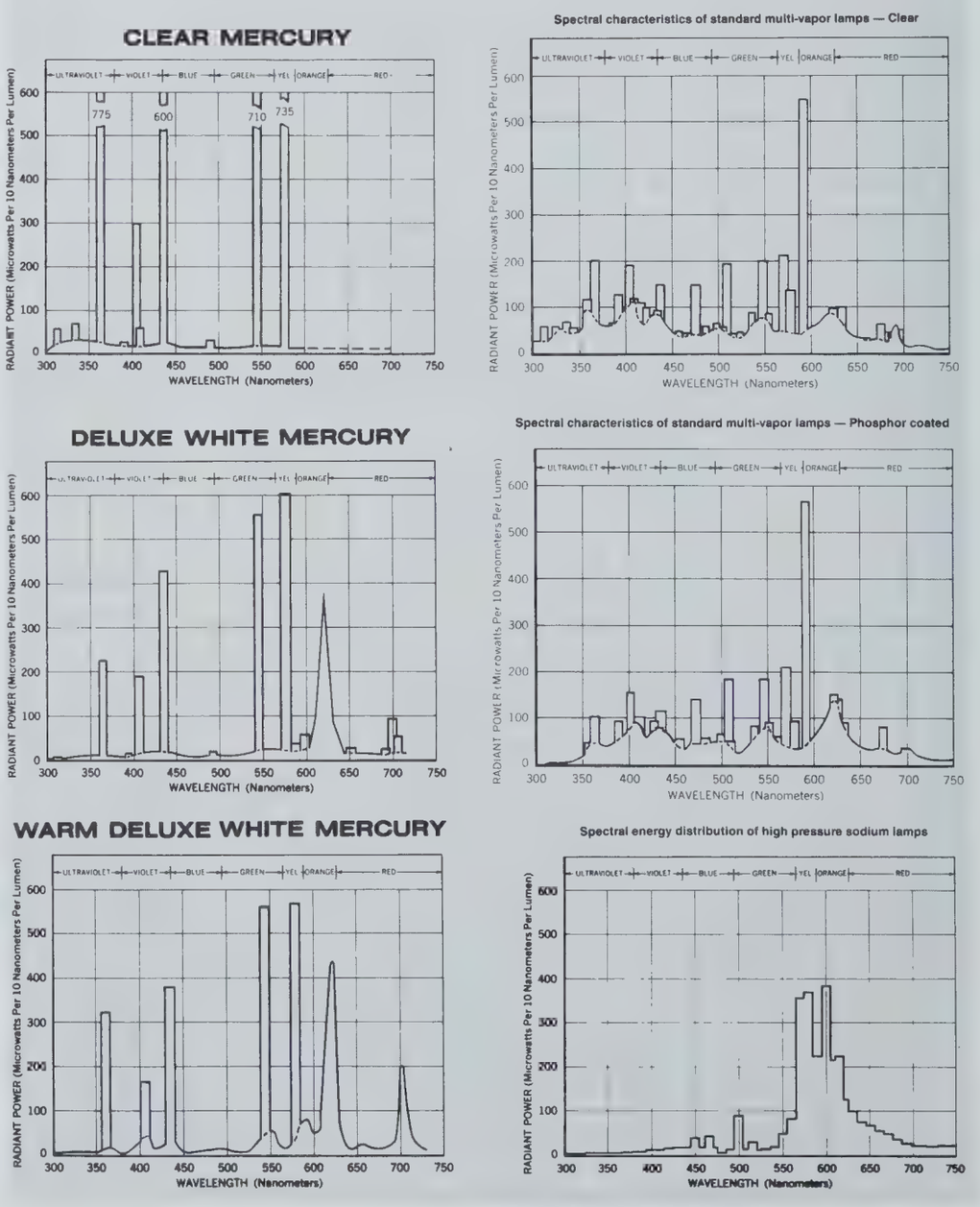
'SAFETY' is your greatest reward for a well-designed lighting system. Safe working conditions are essential in any industrial plant. The environment of your winery should be designed to compensate for human limitations. Any factor that aids 'seeing' increases the probability that your workers will detect the potential cause of an accident and act to avert it.

I once read that "color is a concept that does not exist independent of normal color vision." More than any other single element in design, people's reaction to color affects their response to an environment.

Different people will have different opinions concerning the 'color' of the light emanating from a high-pressure sodium lamp. Some will think that it's orange, some red, and some will say, "I didn't notice," or "Gee, I hate that color."

Generally light color is judged by how people appear in it. There is a strong, unconscious preference for white light

Figure 1



sources that are rich in red light. Such lamps help impart a healthy, ruddy, tanned impression to the skin and flatter the complexion.

People's reaction to the colors of different materials do not always correspond to their reactions to the same colors of light.

A good example is the green in leaf foliage, which is typically regarded as refreshing, calming and reminiscent of a cool, comfortable place. However, green used as the sole or predominant characteristic of a light source tends to produce a macabre, sinister effect. That's why mercury vapor lamps have all but disappeared as a lighting source.

Let's look at the color spectrum of the three most common, high-intensity discharge lamps. In Fig.I, three types of mercury vapor lamps emit strong energy in the green spectrum (500 to 550 nanometers wavelength).

Metal halide lamps, both clear and phosphor-coated, emit strong color energy in the 600 nanometer range — the yellow/orange spectrum. The metal halide lamp is often chosen where color rendition is important, such as in warehouses or where color grading is required. The color spectrum of the metal halide lamp more closely approximates natural daylight than do the other two sources.

The high-pressure sodium lamp produces a spectrum that is strong in the 550 to 650 nanometer range, *i.e.*, the yellow/orange/red spectrum.

Ultraviolet emission

While we are considering the spectral emissions of high-intensity discharge lamps, let's also look at that portion of the spectrum that is, for the most part, invisible to the human eye — ultraviolet light.

Many vintners are concerned about the effect of ultraviolet light (UV) on their wines. I don't pretend to know what effects UV may have on wine quality, but I know there is something you can do about it when making lighting decisions for your wine production facilities.

In Fig.I, the high-pressure sodium light source has virtually no emittence in the 300 to 375 nanometer, ultraviolet range. For this reason alone, it is the choice of many winemakers. We will discuss other advantages of this light source later.

High-intensity discharge light sources are used most often in the processing areas of a winery.

High-intensity discharge (HID) lamps are more accurately described as electric discharge lamps. In an electric discharge lamp, light is produced by a more complex process than in incandescent lamps. The latter have filament wires which are electrically heated to a temperature that causes them to glow brilliantly.

In discharge lamps, light is produced in a manner similar to a lightning bolt, except that instead of occurring in a brief flash, the radiation is sustained. Within the sealed arc tube of the electric discharge lamp are two electrodes and a form of metal which can be vaporized (hence the other name often heard — 'metallic vapor' lamps) and ionized to conduct current in an electric arc from one electrode to another. This produces light, which is then predominant in the color spectrum of the vaporized metal.

I am often asked about the function of a 'ballast' in a HID fixture. When the arc is struck, a condition occurs called 'negative resistance'. Essentially, the arc path is a negative or very low resistance path

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and if there were not a device to limit or 'ballast' the current, the arc discharge would almost instantly draw an unlimited amount of current and destroy itself.

The 'ballast' also performs four other important functions:

1.) It acts as a transformer to change the line voltage to the voltage level required to start the arc discharge.

2.) It provides the correct voltage to allow the arc discharge to stabilize.

3.) It provides a buffer or choke to prevent any voltage or current fluctuation in the arc discharge from reflecting back onto the line circuit.

4.) It compensates for the low-power factor characteristics of the arc discharge.

One of the annoying characteristics of HID lamps is the time it takes for them to come on, or to re-strike after being on. Given the brief explanation above, you can understand why: it takes time for the whole process to transpire. Fig. II describes, in chart form, some of the physical and subjective characteristics of the three types of HID lamps.

FIGURE 2

CHARACTERISTICS	LAMP TYPE				
	CLEAR MERCURY	WHITE MERCURY	DELUXE WHITE MERCURY	METAL HALIDE	HIGH PRESSURE SODIUM
EFFICACY LUMENS/WATT (400 W-INITIAL LUM.)	50	54	48	80	125
LIFE-400 WATT (HOURS)	16000	16000	16000	15000	20000
INITIAL WARM UP TIME (MIN.)	5-7	5-7	5-7	3-5	3-4
RESTART TIME (MIN.)	3-6	3-6	3-6	10-15	1
LAMP APPEARANCE EFFECT ON NEUTRAL SURFACES	GREENISH BLUE-WHITE	GREENISH WHITE	PURPLISH WHITE	GREENISH WHITE	YELLOWISH
EFFECT ON "ATMOSPHERE"	VERY COOL, GREENISH	MODERATELY COOL, GREENISH	WARM, PURPLISH	MODERATELY COOL, GREENISH	WARM, YELLOWISH
COLORS STRENGTHENED	YELLOW GREEN BLUE	YELLOW GREEN BLUE	RED YELLOW BLUE	YELLOW GREEN BLUE	YELLOW ORANGE GREEN
COLORS GREYED	RED, ORANGE	RED, ORANGE	GREEN	RED	RED, BLUE
EFFECT ON COMPLEXIONS	GREENISH	VERY PALE	RUDDY	GREYED	YELLOWISH
REMARKS	VERY POOR COLOR RENDERING	MODERATE COLOR RENDERING	COLOR ACCEPTANCE SIMILAR TO COOL-WHITE FLUORESCENT		COLOR ACCEPTANCE APPROACHES THAT OF WARM WHITE FLUORESCENT

Light source recommendations

For most process applications in a winery, we recommend the High-Pressure Sodium (HPS) light source. Generally speaking, there is not a need for high color resolution in the primary processing and storage (tanks, barrels, etc.) areas.

Color rendition in laboratories and in some case goods warehouses is, however, an important consideration. The arguments for an HPS light source in these areas include its very high light output per watt of power consumed, very short start-up and re-strike time, and rather warm color. HPS is particularly attractive in wooden buildings, or in rooms containing oak or redwood tanks or barrels.

HPS is generally a good choice for virtually all outdoor areas, including the crush area. Studies have shown that HPS light is considerably less attractive to night-flying insects than are other HID sources. This fact alone, makes it a good choice for outdoor lighting needs. HPS in now available in lamp wattages ranging from 35 to 1,000 watts, the most extensive lamp range of the HID sources.

If you store several wine varieties in your case goods warehouse and label color is important for identification, the light source of choice would be metal halide. I generally recommend the clear lamp rather than the phosphor-coated.

Lamp manufacturers phosphor-coat metal halide lamps for better color rendition, but you sacrifice some optical control. In warehouse lighting applications, you want the best optical control possible in order to do the most efficient lighting with the least number of fixtures.

Fixture types, fixture quality, and 'what works best where' will follow in Lighting, Part II. ■

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Protecting water quality in Oregon

ABOVE: Aerated Lagoon — Surface aerator tied to mooring posts provides air for biological stabilization of waste. Inlet piping is on right, outlet piping to irrigation system is on left. *Photo: Nancy Budrow*

ABOVE LEFT: Control panel regulates anhydrous ammonia injection into sump for pH control and nutrient addition.

LEFT: Rotary screen on the right discharges screened solids into bin with liquid portion piped to pump sump. *Photos: Bill Phillips*

By Bill Phillips, P.E. and Jim Knutson, P.E.

Montinore Vineyards has completed the first construction phase of a new winery in Washington County, Oregon, 35 miles west of Portland. At ultimate capacity, the winery will produce 125,000 cases/year of premium wine, from several grape varieties grown on Montinore's 490 acres.

To bring the project to fruition, romantic winemaking concepts had to be melded with basic engineering requirements; one of which was how to handle process wastewater from the winery.

Because of the high concentration of winery wastewater and its potential impact on ground water and surface waters, proper treatment and disposal are critical for protection of the environment. With increasing environmental awareness in the wine industry, and the adoption of more restrictive requirements by regulatory agencies on discharges from wineries and food processing facilities, serious efforts are being made to address this need. Proper treatment and disposal of winery process wastewater must be considered an integral part of any winery operation today.

Process wastewater management system

Process wastewater treatment facilities for the winery were designed by Summit Engineering, Inc. of Santa Rosa, CA in cooperation with Jeff Lamy, General Manager of Montinore. This state-of-the-art system includes collection and pretreatment (screening and pH adjustment), followed by biological treatment in an aerated lagoon system, with the effluent used for vineyard irrigation.

The environmentally conscious design approach included consideration of water conservation and solids management within the winery, ground and surface water protection, and the beneficial use of the reclaimed water in the vineyards.

The process wastewater management system begins in the winery with water conservation and solids management.

There are three components to the water conservation program: selection and use of equipment; employee training/motivation; monitoring of water use. The requirement for low water use during cleaning was a factor in Montinore's selection of Willmes and Defranceschi membrane presses. Other techniques and equipment include:

- Initial fermentation tank cleaning is accomplished by spraying recycled cleaning solution through a turbo disk.
- Pressure washers, putting out a high-pressure low-volume spray, are used for a number of cleaning operations.
- A shop vac, brooms, and a small street sweeper are used on floors and crush pad before hose-down to avoid chasing solids with water.
- Trigger-activated nozzles are provided for all hand-held washing.

Ongoing training and review of wash-down and other water use procedures with personnel should insure continued water conservation. Daily reading of the process wastewater meter will provide a means of evaluating those efforts.

Solids management within the winery benefits the wastewater treatment system in two ways: 1) reduces maintenance on pumps and pipelines, and 2) reduces solids and organic loading to the aerated lagoons. There are three major components of the solids management program:

- Internal and external process wastewater drains are provided with screens to exclude gross solids.
- Lees and bentonite are handled separately to keep them out of the wastewater system. This is accomplished with a plate-and-frame lees press and a rotary-vacuum lees filter.
- Mechanical screening is provided in the pretreatment area to remove additional solids down to 0.020-inch diameter.

Recovered winery solids are applied to the vineyard as a soil conditioner.

In addition to mechanical screening, the pretreatment area, provides pH adjustment, pumping, and flow metering. A rotary screen was selected to minimize the need for operator attention. The pH of the wastewater stream is adjusted using anhydrous ammonia, which also provides nutrients needed in the biological treatment process in the lagoons.

Pretreatment pumps convey screened and pH-adjusted process wastewater to the aerated lagoons. Besides providing important feedback for water conservation efforts, metering of process wastewater flows gives information for monitoring system operation and a record of flow data to facilitate appropriate adjustments as the winery grows into its capacity.

Biological treatment of the aerated lagoon type is provided in two ponds: pond #1 has a one million gallon capacity; pond #2, 0.43 million gallons. Oxygen required

by microorganisms to break down the waste, measured by biochemical oxygen demand (BOD), is provided by mechanical surface aerators — two 7.5-horsepower aerators are provided in pond #1 and one 5-horsepower aerator in pond #2.

The ponds are sized to provide a minimum 60-day residence time for average crush-day flows and enough additional storage to balance process wastewater and 10-year rainfall inputs against reduced winter evaporative losses and irrigation applications.

The aerated lagoons have a minimum 2-foot thick impermeable clay liner to prevent transport of untreated wastewater into the groundwater. The lagoons have self-priming centrifugal pumps, one for irrigation purposes and another to transfer water from pond #2 to pond #1 for dilution or biological reseeding.

For wineries the size of Montinore, the aerated lagoon treatment system is highly desirable for several reasons. Because of the available dilution capacity, these systems are able to handle seasonal loading and surges in hydraulic and organic loading (common in wineries), with little difficulty. Minimal operator attention and monitoring are required.

Besides providing treatment, the ponds store effluent to balance seasonal irrigation demands. When properly designed and operated, the potential for environmental problems, including odors and ground and surface water contamination, are minimal.

Lagoon effluent will be used to irrigate approximately 12 acres of vineyard. Average annual application rates, with the winery at full capacity, are projected to be approximately 6.5 inches of water with the equivalent of two pounds of nitrate, seven pounds of organic nitrogen and seven pounds of phosphorus applied per acre. (Nitrite and ammonia are negligible.)

To preclude direct runoff of treated wastewater into surface waters, irrigation will be suspended prior to, during and after storms, for as long as the soil is saturated.

A major challenge was disposal of the wastewater via vineyard irrigation in a manner compatible with sound viticultural practices. Some of the water will be applied to a block of Pinot noir, (with vines spaced 3.5 × 10 for champagne production) which can tolerate additional irrigation. Irrigation will be suspended one month before, and during, grape harvest.

Wastewater will also be applied to an adjacent Pinot noir plot designated for premium red wine. Application is timed for the moment of maximum berry upsizing to enhance the fruity character of the wine.

Regulatory requirements and government agency interactions

The primary regulatory agency for winery process wastewater treatment facilities in Oregon is the Dept. of Environmental Quality (DEQ). An 'Application for Water Pollution Control Facilities Permit' was prepared and submitted to the DEQ along with a report describing the proposed facility and preliminary design criteria.

A 'Wastewater Management Plan' was also prepared for DEQ review. This plan provides detailed information on water quality aspects of the project, including features protecting ground and surface water from contamination, and irrigation application rates. This information was reviewed by DEQ to assess whether the

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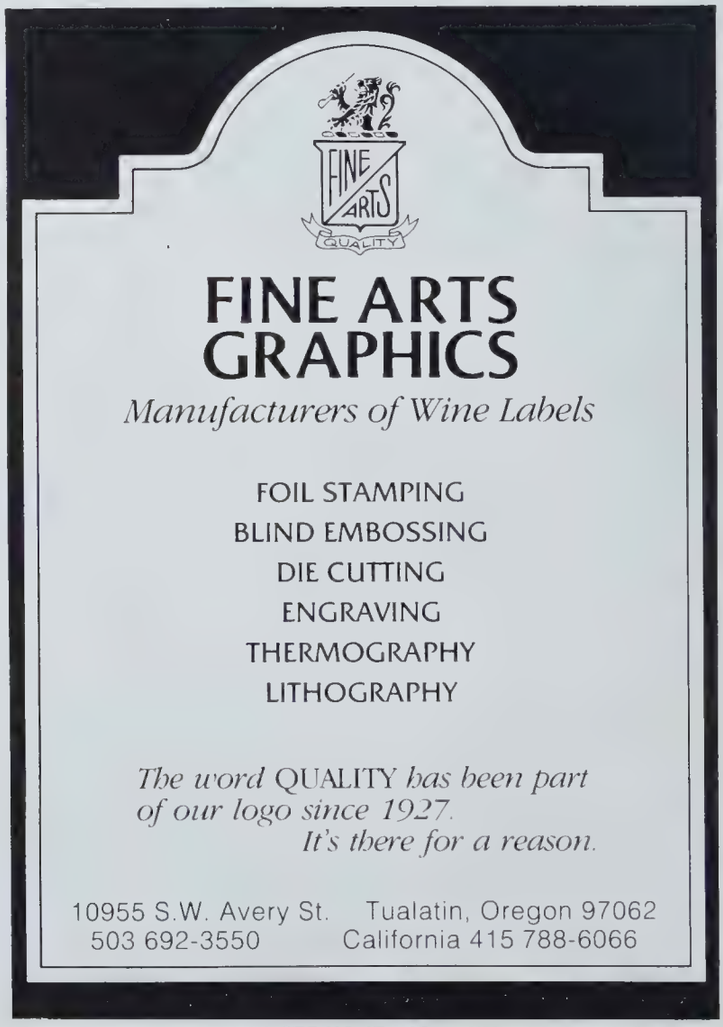

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proposed treatment/disposal methodology met mandated discharge requirements.

Other government agencies were also contacted for information and review of various aspects of the project. The U.S. Dept. of Agriculture's Soil Conservation Service provided information on vineyard irrigation requirements and rainfall data. The Tualatin Valley Irrigation District supplied evaporation and rainfall data.

The Watermaster, an officer of the Oregon Water Resource Dept. (WRD), provided additional climatological data and information on wells in the vicinity. The Dam Safety Division of the WRD reviewed the pond plans.

The Washington County Dept. of Land Use & Transportation provided floodplain information. Information submitted to DEQ was also reviewed by the Washington County Dept. of Public Health. Tualatin Valley Irrigation District was contacted for their input on the irrigation plan. A permit was required by the Federal Bureau of Reclamation for application of the reclaimed water for irrigation.

Summary

From the beginning of the project, the process wastewater management system was integrated into the planning of the facility, from water conservation and solids management efforts in the winery to the beneficial use of reclaimed water in the vineyards.

Implementation of this comprehensive approach to water and wastewater management benefits the entire Montinore Vineyards winemaking process while also protecting the environment and agricultural nature of the area. ■

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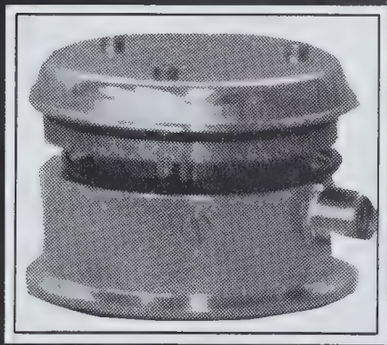

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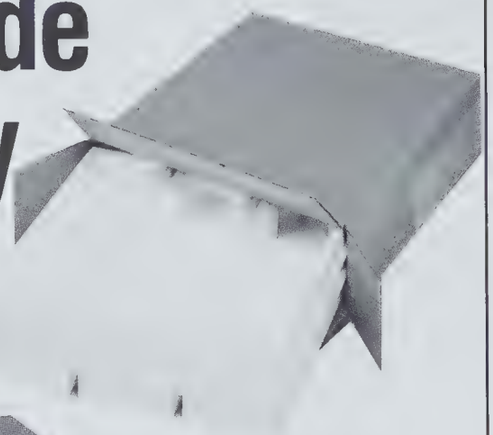

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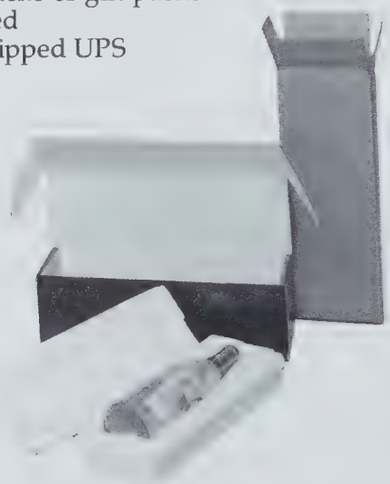

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In the Cellar

Jake Lorenzo

We saw the first one at Brolio castle. He opened the heavy metal gate and waved us through. Obviously a working man, with clothes dirty from the good earth. His hands were gnarled, his hair grey, his face weathered. He was that classic Tuscan age, somewhere between 50 and 1,000.

We called him Bruno. Look around and Bruno's gone. We wander down to the chapel. The door swings open. Bruno stands to the side with downcast eyes. Glance at the stained glass and we're alone. We walk through the gardens. Bruno clams the dogs. Take a right to the castle, and the doors slowly open from the inside, Bruno in the wings.

Every castle and badia has a Bruno. Ancient, unspeaking, lightning fast, able to pass through walls, always ahead of you, never where you saw him last.

Take it from Jake Lorenzo, the Brunos of Tuscany are the missing links to her past. Keepers of the castle, mute remnants of the feudal times. Bruno may have secrets, but he ain't talking.

Tuscany is a land of startling, harsh beauty. I remember the stunning glory of the Tuscan hills, with their ancient badias and towers guarding grapevines and olive trees as they have for more than 1,000 years, and the incongruity of the sun glinting off stainless steel tanks nestled into the battle-scarred walls of antiquity.

Mostly, I remember the people, hard and gnarled like the hills. Provincial thinkers, perfectly satisfied with Tuscan wine, unsalted Tuscan bread, Tuscan pasta and steak florintina. Not in the least curious about other peoples, their foods or their lives. Then again, Tuscans are old, somewhere between 50 and 1,000, hard to tell.

Jake Lorenzo has to wonder, "Where the hell are the kids?"

Screaming through the narrow streets of Firenze on their pestilential motor scooters is my guess.

Kids have curiosity, and it must be satisfied. So they move to the cities, go to school, watch MTV. They become Italian lawyers and accountants and bankers. They live in crowded, noisy cities. They work hard, become successful and prosperous. They buy fashionable clothes, drive fancy tiny cars, furnish lovely apartments.

They give up leisurely meals in simple country restaurants to wolf down panini standing in crowded bars. They give up 60-minute capuccinos at an outside table for a gulped espresso standing in a packed shop. They develop stress and tension, and when they make their rare trips home to the countryside, they find that land prices have tripled, housing has quadrupled.

But the land is unchanged: vines and olive trees, bumpy dirt roads, a slow, unhurried life filled with neighborly gossip.

Who knows when it will hit them? Eventually, it must.

They'll go back to the land. When they do, Bruno will open the doors. He'll show them how to make the wine, how to press the oil, but he ain't gonna tell them a damn thing. Let them figure it out for themselves.

It's the Tuscan Way. ■

Eclectic palate trickery

by Eleanor & Ray Heald

In 1984, Mary Evely, of Simi Winery, Healdsburg, CA, found the cost of existing food and wine seminars personally prohibitive. "The better programs cost about $95/person which was not in my budget," she recalls.

Believing that there were other people like herself who had an interest in both food and wine, she encouraged Simi Winery principals to establish a food and wine program to be presented at the winery. They have proven to be a great success, and Evely now conducts five food and wine pairings and three library vertical tastings each year.

Described in a streamlined, tri-fold brochure, the program offers two types of events for interested consumers. The brochures are mailed to previous attendees and to publications for their event calendars. The fee, which covers only labor and food costs, varies with the format. Library vertical tastings compare six vintages of a single varietal, served with a complementary food. Cost is $15/person.

Examples of these tastings include: Chardonnay and Exotic Mushrooms; Sauvignon Blanc and Oysters (with oyster-lore provided by Michael Watchorn of Hog Island Oyster Co. in Sonoma County); and Reserve Cabernet Sauvignon and Laura Chenel Chevre.

Food & Wine Pairing luncheons provide a palette of distinctly flavored food dishes and a variety of wines with commentary by Evely. Cost is $25 to $30/person. Guest chef presentations are $35/person.

Past events have included an East/West Pairing with chef John Ash, John Ash & Co., who shared insights from his recent work/study travels in Japan. An Italian Regional Pairing with chef Michael Hirschberg, Ristorante Siena, highlighted regional styles of Italian cuisine and complementary wines.

Guests chefs in 1990 will be Rick Rozet of the Sundial Grill in Hopland, and Mark Malicki from Truffles Restaurant in Sebastopol.

To preserve a group experience, encourage dialogue, and reduce intimidation, participation is limited to 36 people.

Evely stresses that she is always mindful of quality food along with quality service.

"The format evolved during the first year," she remarks. "We knew from the start that people don't want to be lectured; they desire a personal investigation. Participants vote on their favorite pairings and I vote on mine. I've kept notes and that helps me develop new presentations.

In the tasting, every dish is sampled with every wine. A typical format for Evely is nine dishes and six current release Simi wines: Chenin Blanc, Chardonnay, Sauvignon Blanc, Rosé of Cabernet Sauvignon, Cabernet Sauvignon, and Muscat Canelli.

Participants receive a tasting sheet organized with wine types across the top and foods down the left side. They have

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an 8-oz glass of each of the wines. A presentation of three plates with three food items on each plate is made. The flavor components on each plate do not necessaily match each other.

"When people leave, they feel comfortable with wine and food because they realize there is no single correct answer. They understand that personal choices are important," Evely contends.

"Except for the Muscat, which is available only at the winery, Simi wines are well-distributed and available, so that the consumer can find the wines easily and repeat the experience in their home if they like," Evely notes. (Attendees can purchase bottles of wine from the Simi retail room after the presentation to take home for future experimentation.)

The matchup

"I deliberately try to focus on food preparations that are traditionally considered difficult pairings with wine," Evely stresses. "Crudités, a simple appetizer, are not easily matched with a Chenin Blanc in the Simi style with 1% residual sugar and 7.0 g/L TA. An off-dry wine paired with vegetables loses its perceptible acidity and becomes flabby and finishes flat. You might consider using sweeter vegetables, but snow peas are sweet, and they make Chenin Blanc bitter.

"However, if you prepare a salad dressing or dip with mayonnaise base and tarragon, a sweet herb, you alter the flattening effect of the vegetables and complement the Chenin Blanc."

Options with Rice Salad

Evely specializes in simple recipe adaptations to make the preparation complementary with more than one wine. She utilizes palate trickery in a Rice Salad recipe when she uses tarragon to pair with Chenin Blanc, then substitutes 1 teaspoon (t) ground cumin for the tarragon to pair it with Sauvignon Blanc, or 1t dry or 2 tablespoons (T) chopped fresh basil to pair with a Chardonnay.

She finds the Foil Baked Chicken with Herbs recipe in *The Silver Palate Cookbook*, Rosso and Lukins with McLaughlin, (Workman Publishing Co., Inc., 1982) a reliable match to Simi-style Chenin Blanc. To make the chicken dish complementary to Sauvignon Blanc, she substitutes thyme for the mint and dill; one red onion, thinly sliced, in place of the lemon; and uses 2T virgin olive oil for 2T of butter.

The Sauvignon Blanc variation converts to a match with Cabernet Sauvignon when two ripe, peeled, seeded, and finely chopped tomatoes are added and the pepper mill is adjusted to very coarse and used generously.

Choice of olives

For pasta with olive-accented uncooked tomato sauce, Evely suggests that the type of olive used defines the wine that pairs best. For Cabernet Sauvignon, she suggests oil-cured olives. Sauvignon Blanc is well-served by Kalamata olives and Chardonnay does best with generic canned olives.

Choice of mushrooms

With a mushroom risotto, Evely notes that the type of mushroom determines the best wine combination. Shiitake and morels make the dish compatible with Cabernet Sauvignon when beef broth is the cooking liquid.

Chanterelles, porcini, and oyster mushrooms are perfect with an oak-aged Chardonnay. Dried porcini mushrooms, on the other hand, are much more aggressive in flavor and tend to take the dish back into the Cabernet Sauvignon range. If fresh porcinis are not available, but a match for Chardonnay is required, Evely suggests using ½-oz of dried porcini (soaked in hot water, ½-hour) with ½-lb of ordinary white hot-house mushrooms.

Butter in the risotto echoes the butteriness in the 1987 Simi Chardonnay. "The delicate, earthy flavors of fresh porcini are well balanced by the delicate, toastiness of the wine," she remarks. "Fresh parsley, or even better, fresh chervil, with its sweet note, accents the fresh fruit flavors of this Chardonnay."

Chocolate Desserts and Wine

For a chocolate mousse tasting, Evely tested bittersweet, semi-sweet, and white chocolate mousse with the Simi 1982 Reserve Cabernet Sauvignon, 1985 Cabernet Sauvignon, and 1988 Muscat Canelli (7.9% R.S.)

Preferred pairings were 1982 Reserve with bittersweet, 1985 Cabernet with semi-sweet, and Muscat with the white chocolate.

"I view Cabernet Sauvignon as serving the same sort of function as coffee with a chocolate dessert," she contends. "The tannin/bitter flavors cut through the richness and clear the palate. I think, however, the wine suffers as a result, appearing thin and tart when tasted after chocolate.

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"What's the answer then? For me, it is Cognac. Since Simi is owned by Moet-Hennessy, I think it's OK for me to propose this! With cognac, there is a balance of flavor intensities and richness, but not a cloying double hit of sugar that a dessert-style Muscat presents with chocolate."

Evely's favorite mousse recipe is Julia Child's from *Mastering the Art of French Cooking*, Vol.I, Alfred A. Knopf, 1971. The recipe uses orange liqueur and she has substituted cognac with good results. She uses bittersweet chocolate in the recipe without a problem.

However, white chocolate has a different structure and requires a different procedure. Evely remarks that the sweetness of white chocolate requires the acid break of fresh fruit. She suggests fresh raspberries or a raspberry puree sauce if raspberries are not in season. "In this form, it pairs well with the Muscat," she affirms.

"In working on the chocolate pairings, I concluded that the sugar/acid levels were the controlling factors much more than the flavor components with desserts. I can't think of any dessert flavoring that would make significant changes in a wine choice." ■

RICE SALAD

Serves 6 as a side dish

Ingredients:

1 cup uncooked long-grain rice
6 Tbs. olive oil
3 Tbs. wine vinegar
1 tsp. salt
½ tsp. freshly ground pepper
½ tsp. dried tarragon*
1 sweet red pepper, chopped
¼ cup chopped parsley
¼ cup chopped chives
1 small cucumber, seeds removed, chopped
3 green onions, green & white parts, sliced
1 head butter lettuce, or other greens
Vinaigrette dressing

Method:

1. Cook rice according to package directions and mix while still hot with the oil, vinegar, salt, pepper and tarragon. Let cool to room temperature.
2. Mix in chopped vegetables, dress with vinaigrette to taste, and serve on a bed of greens.

* Tarragon marries this dish to Chenin Blanc (Simi style, with about 1% RS). For Sauvignon Blanc, substitute 1 tsp. ground cumin for the tarragon. For Chardonnay, substitute 1 tsp. dry or 2 Tbs. fresh basil, chopped.

— *Mary Evely*

FULL BAKED CHICKEN WITH HERBS

For Chenin Blanc (@ 1% RS) *Serves 6*

Ingredients:

6 chicken breasts, skinned and boned, (about 4 lbs.)
1 cup chopped fresh mint, dill and parsley combined
2 cloves garlic, minced
2 lemons, sliced
4 Tbs. unsalted butter
salt & freshly ground pepper to taste

Method:

1. Cut breasts in half and flatten with the side of a cleaver. Put each piece on foil and season with salt and pepper.
2. Sprinkle herbs over chicken, arrange lemon slices on top and dot with butter.
3. Seal packets and bake in a 350° oven for 30 minutes. Allow guests to open packets at the table.

For Sauvignon Blanc:
Substitute thyme for the mint and dill; 1 red onion, thinly sliced in place of the lemon; 2 Tbs. virgin olive oil for half of the butter.

For Cabernet Sauvignon:
To the Sauvignon Blanc ingredients add 2 ripe tomatoes, peeled, seeded and finely chopped. Adjust pepper grinder to very coarse grind and use generously.

— *Chenin Blanc version from The Silver Palate, variations by Mary Evely*

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JULY 6-8, Friday/Sunday

International Merlot Symposium — Series of seminars and tastings for winemakers and growers. Speakers include winemakers and viticulturists from St. Emilion and Pomerol, Napa and Sonoma, Washington State, and Long Island, NY. **Location:** Suffolk County Community College, Riverhead, Long Island, NY. **For more information:** contact Phil Nugent, phone: 212/925-2251 or 516/447-1004; or write: International Merlot Symposium, BOCES I — Special Programs, 540 Plaza, Riverhead, NY 11901.

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JULY 13, Friday

Taste of the Barrel — Class is designed for production winemakers and emphasizes the tasting of commercial and experimental wines using differing levels and types of oak treatment. Lectures by coopers and production winemakers address topics on barrel production, theory and factors affecting flavor extraction, a discussion of phenolic tracking (fill cycles and extraction curves), and effects of wood on wines. **Instructor:** Bob Rogers, Custom Cooperage, Sonoma, CA. **Time:** 9am - 5pm. **Location:** UC Davis. **Fee:** $130 (includes lunch).

JULY 14-15, Saturday/Sunday

Wine Microbiology — This class combines training on the microscope with lectures on yeast and malolactic bacteria strains, starter cultures, fermentation, and sanitation; and laboratory exercises in identifying wine microorganisms, use of sterile techniques, plating of cultures, isolation of microorganisms, use of counting chambers and sterile bottling detection systems. **Instructors:** Ralph Kunkee, Phd, professor, Marilynn Vilas, staff research associate, and George Cooke, enology extension, Dept. of Viticulture & Enology, UC Davis. **Time:** 8:15am - 4pm. **Location:** UC Davis. **Fee:** $325 (includes 2 lunches + 1 dinner).

JULY 16-19, Monday/Thursday

Wine Processing — This workshop is designed for those who have not taken Dr. Roger Boulton's wine processing course and combines lectures with lab exercises to cover major phases of wine processing and stability testing. **Topics:** Juice conditioning and acidity adjustment; Pectic and oxidative enzymes; Filtration and clarification of wines; Fining agents and fining trials; Tartrate and protein stability testing; Sulfite and sulfide reactions in wines; and Exchange and absorption processes. **Instructor:** Roger Boulton, PhD, professor, Dept. of Viticulture & Enology, UC Davis. **Time:** 9am - 4:30pm. **Location:** UC Davis. **Fee:** $550.

JULY 20, Friday

Vineyard Canopy Assessment — This workshop will explain why canopy management is needed, principles of grapevine canopy microclimate manipulation, and how canopy microclimate influences fruit and wine composition and quality, crop yields, and incidence of diseases. Lectures will cover leaf and shoot removal, hedging, shoot positioning, vine spacing, bud number/vine and trellising systems. Also included will be hands-on experience in learning to assess vineyards for potential wine quality using the 80-point scoring system developed by Dr. Richard Smart. Several new types of trellis/training systems will be demonstrated. **Instructor:** Mark Kliewer, PhD, professor, Dept. of Viticulture & Enology, UC Davis. **Time:** 9am - 4:30pm. **Location:** UC Davis. **Fee:** $100 (includes box lunch).

JULY 21, Saturday

Selling Wine Directly to the Consumer — Explores the buying psychology of the fine wine consumer and the limitations of the traditional marketplace. Direct mail will be discussed in depth as a model for decisions and techniques that can apply equally well to creating 'sell-through' in retail and restaurants. **Topics:** price points, targeting an audience, designing sales material, copywriting, list acquisition and building, print production and financial planning. **Instructor:** Bruce Cass, wine marketer, San Francisco, CA. **Time:** 9am - 4pm. **Location: UC Davis. Fee:** $120 (includes box lunch.

JULY 21, Saturday

Managing the Home Vineyard — **Topics:** Annual maintenance procedures; Renovating and retrofitting older or poorly maintained vineyards; ground cover, fertilizing, frost, canopy management, irrigation, pest and

disease control, harvesting and pruning. **Instructors:** Nancy Rosner + Eddy Szyjewicz, DeVine viticultural consultants, Los Gatos, CA. **Time:** 9am - 4pm. **Location:** UC Davis. **Fee:** $90 (includes box lunch).

AUGUST 4, Saturday

Successful Home Winemaking — Covers all phases of home wine production for beginning home winemakers. Sack lunch suggested. **Instructor:** Jim Lapsley, winemaker, Orleans Hill Winery, Woodland, CA and former home winemaker. **Time:** 9am - 3pm. **Location:** UC Davis. **Fee:** $60.

AUGUST 18-25, Saturday/Sunday, Wednesday & Saturday

Step-by-Step Winemaking — Hands-on class for the novice home winemaker to learn winemaking with actual experience in the UC Davis enology cellar. Emphasis will be on the actual process rather than winemaking theory. **Instructor:** Ted Miller, Cellarmaster, Dept. of Viticulture & Enology, UC Davis. **Time:** Aug. 18,19: 9am - 12noon; Aug. 22: 7pm - 9pm; Aug. 25: 9am - 12noon. **Location:** UC Davis. **Fee:** $160.

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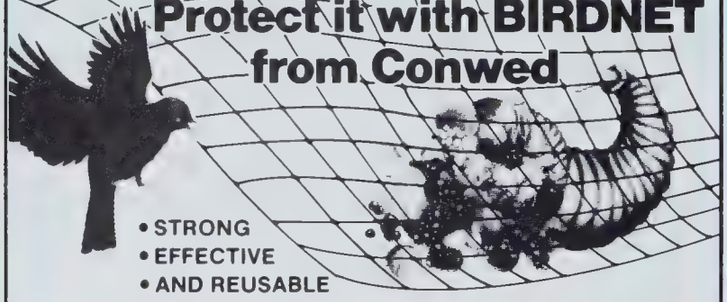

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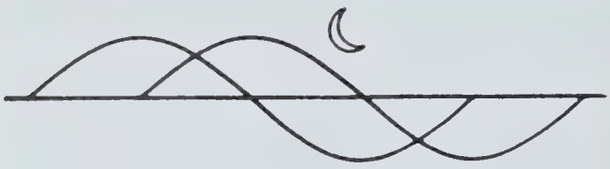

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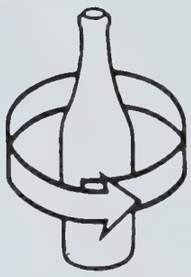

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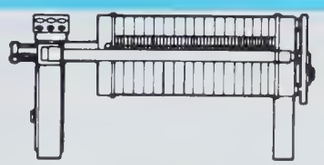

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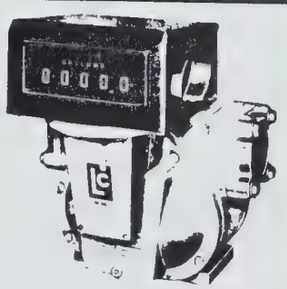

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- Brochures offered in bingo cards, take-one boxes and more
- Direct response television commercials (rare for wineries)
- Informercials (program-length TV commercials; also rare)
- Direct response radio
- Matchbooks with coupons printed inside
- Electronic bulletin boards
- Inserts (preprints)
- Statement stuffers
- Catalogs

Understand that direct marketing for a winery no longer means just doing a mailing. It involves doing a mailing, followed by a phone call, followed by a postcard, followed by another phone call.

It means knowing the exact cost of each sale you make. It means comprehending that direct marketing is a way for wineries to overcome the barriers of poor location or distribution.

Direct marketing, in the hands of a guerrilla, is not a hit or miss proposition; it has a slam dunk certainty of succeeding. But this is only because the guerrilla has suffered the pangs of repeated loss and defeat on the way to developing the proper mix of message and media.

The guerrilla tests many offers, many methods of stating them, and many media to reach the target audience — tests these components one by one until a successful formula is created.

A true understanding of direct marketing enables you to:

- support distributors and retailers
- reach buyers from small towns not visited by your sales force
- announce new wines and price changes
- convert sales calls into sales
- obtain hot leads for salespeople
- supplement your other forms of marketing
- develop new markets
- energize marginal territories
- ***increase your profits by eliminating the middleperson.***

It's a heady list. Look into it.

Consider all the methods by which you can put direct marketing to work for the benefit of your customers, your winery, and your future, a future that probably will depend upon your understanding of direct marketing. ■

(Jay Conrad Levinson is the author of Guerrilla Marketing, Guerrilla Marketing Attack, and publishes The Guerrilla Marketing Newsletter. For a free brochure, call 800/748-6444.)

New location for Barrel Builders

Barrel Builders announces their new office at 1194 Maple Lane, just off Highway 29, halfway between St. Helena and Calistoga (in the Flynnville complex). Please call 800/365-8231 or 707/942-4291 for cooperage, cooperage supplies, and barrel shaving and repair services. Customers who want to drop off barrels for repair, should call first. Please note our new FAX number: 707/942-5426 and new mailing address: PO Box 268, St. Helena, CA 94574.

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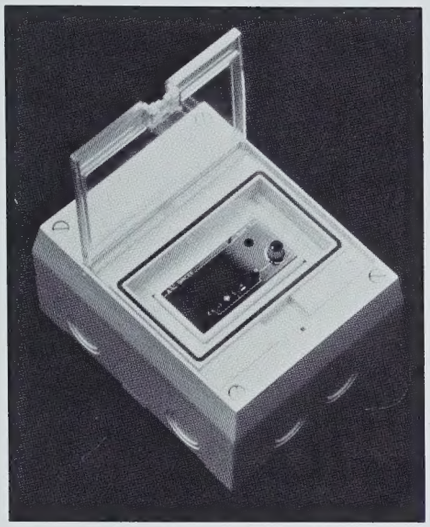
TEMPERATURE/DENSITY CONTROLS

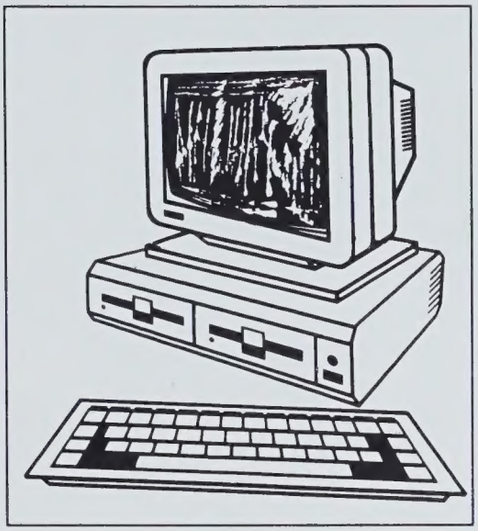
FOR THE WINE INDUSTRY

By Sircee in Bordeaux

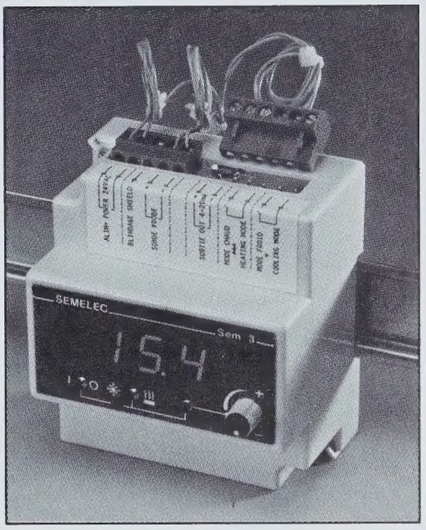
THE NEW SEM-3 TEMPERATURE CONTROLLER WILL MEET ALL YOUR NEEDS TODAY AND IN THE FUTURE.



Tank Mount



Computer Option



Central Panel

SEM -3 TEMPERATURE CONTROLS

- 1 1/2F Differential
- High Temperature Alarm
- Local Inventory
- 4-20MA Output
- Heat/Cool Switch
- Track Mount
- 24V or 115 V Power
- Probe Length 1000 ft.

SEM-4 DENSITY CONTROLS

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- Fermentation Control
- 100% Back Up
- Inputs to Computer
- Graphics Temp. vs Brix
- Tank History

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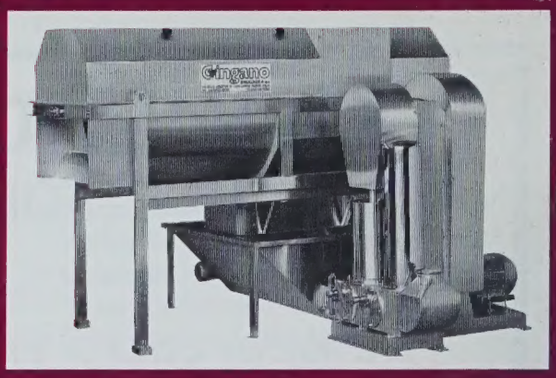

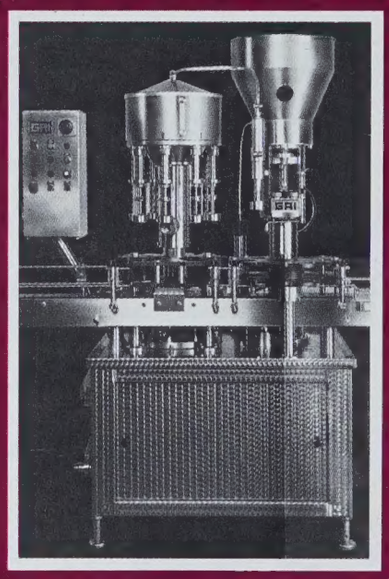

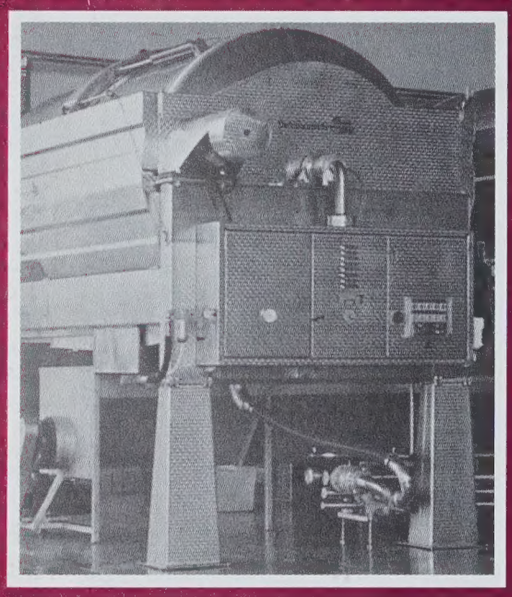

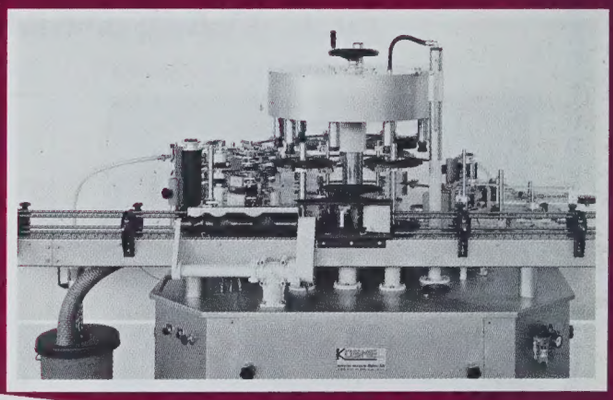

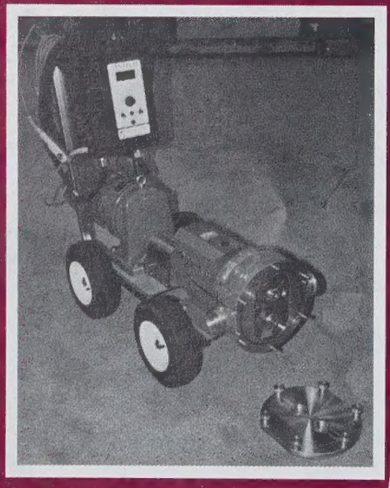

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